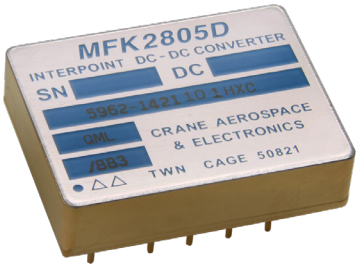
MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

FEATURES

- 16 to 50 volt input
- Up to 87% efficiency, 42 W/in^3
- Available to Class H, MIL-PRF-38534
- Undervoltage lockout
- -55°C to +125°C operation
- Fully isolated, magnetic feedback
- Fixed frequency, 500 kHz typical
- 80 volt transient protection per MIL-STD-704A
- Inhibit and sync function
- Indefinite short circuit protection
- Soft-start function limits inrush current during start-up



MODELS OUTPUT VOLTAGE (V)	
SINGLE	DUAL
1.8	±5
2.5	±7
3.3	±12
5	±15
5.2	
5.7	
12	
15	
28	

DESCRIPTION

The Interpoint® MFK Series™ of DC-DC converters offers up to 25 watts of power in a low profile package. The MFK converters are manufactured in our fully certified and qualified MIL-PRF-38534 Class H production facility and packaged in hermetically sealed steel cases. They are ideal for use in programs requiring high reliability, small size, and high efficiency. The high frequency series offers a wide input voltage range of 16 to 50 volts and up to 25 watts of output power. The converters provide 80 volt transient protection per MIL-STD-704A. The package is a hermetically sealed, welded metal case. Flanged and non-flanged models are available.

CONVERTER DESIGN

The MFK converters are switching regulators that use a quasi-square wave, single-ended forward converter design with a constant switching frequency of 500 kHz, typical. Isolation between input and output circuits is provided with transformers in the power path and in the feedback control loop.

At 0.360 inch high and a total footprint of 1.7 in^2, this low profile package offers a total power density of up to 42 watts per cubic inch.

The dual models can be used as a single output voltage by connecting the load between positive and negative outputs, leaving the common unconnected, resulting in double the output voltage. (for example, MFK2815D can be used as a 30 volt output.) When using a dual to double the output voltage (span voltage) the maximum load capacitance across the span voltage is half that specified for each output.

AUDIO REJECTION AND FILTERING

The MFK converters current mode control system provides excellent dynamic response and audio rejection. Audio rejection is typically 50 dB. Output voltage response for a 50% to 100% step load transient is as low as 4% with a 400 µs recovery time.

The MFK Series converters are provided with internal filtering capacitors that help reduce the need for external components in normal operation. Use our FMCE-0328 EMI filter to meet the requirements of MIL-STD-461C CE03 and CS01 and MIL-STD-461D, E and F CE102 and CS101. Any of our Interpoint FMCE filters can be used to the rated current of the filter.

INHIBIT AND SYNCHRONIZATION

MFK converters provide an inhibit terminal that can be used to disable internal switching, resulting in no output and very low quiescent input current. The converter is inhibited when the inhibit pin is pulled below 0.8 volts. The converter is enabled when the pin, which is internally connected to a pull-up current source, is left unconnected or is connected to an open-collector gate. The open circuit voltage associated with the inhibit pin is 8.5 to 12 volts. In the inhibit mode, a maximum of 4 mA must be sunk from the inhibit pin.

A synchronization feature is included with the MFK Series that allows the user to match the switching frequency of the converter to the frequency of a system clock. Synchronization allows the user to adjust the nominal 500 kHz operating frequency to any frequency within the range of 450 kHz to 550 kHz. This is initiated by applying an active high input of the desired frequency to the sync pin. See Table 5 on page 6 for more information.

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

Short Circuit Protection

MFK Series converters provide indefinite short circuit protection by folding back the output voltage at approximately 125% of the full load output current.

Undervoltage Lockout

Undervoltage lockout with hysteresis prevents the converters from operating below approximately 15 volts input voltage to keep system current levels smooth, especially during initialization or re-start operations.

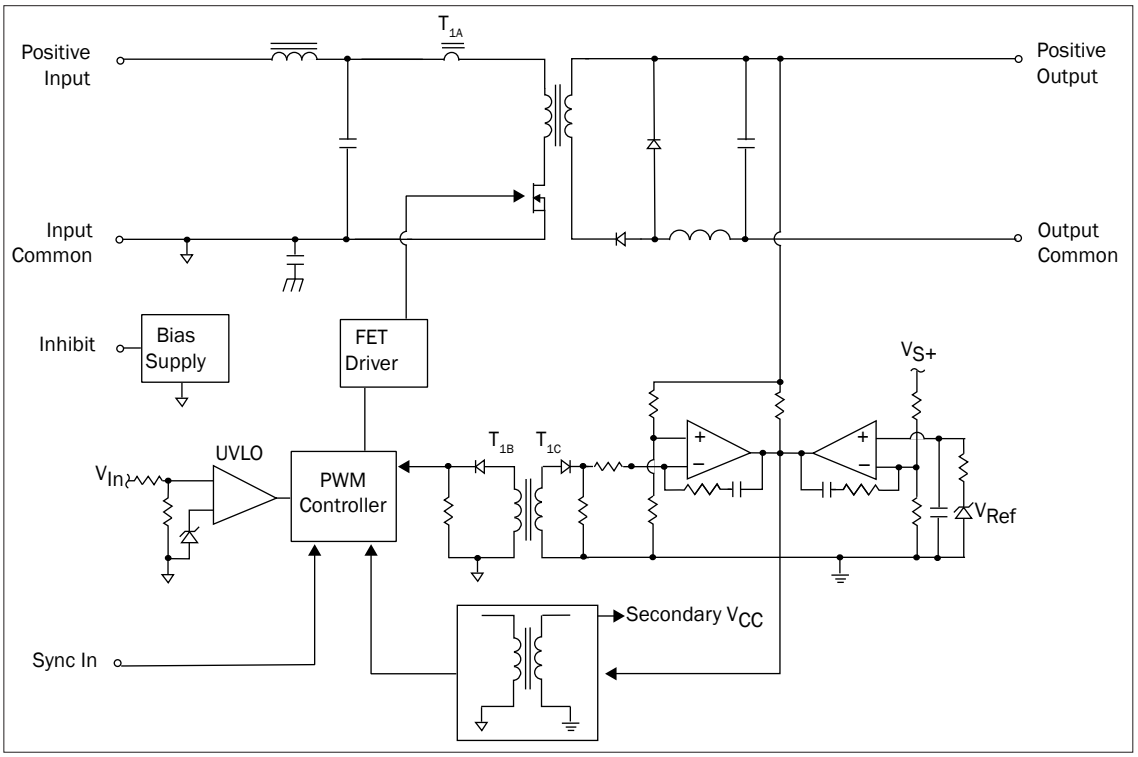


Figure 1: MFK Single Block Diagram

MFK Single and Dual DC-DC Converters

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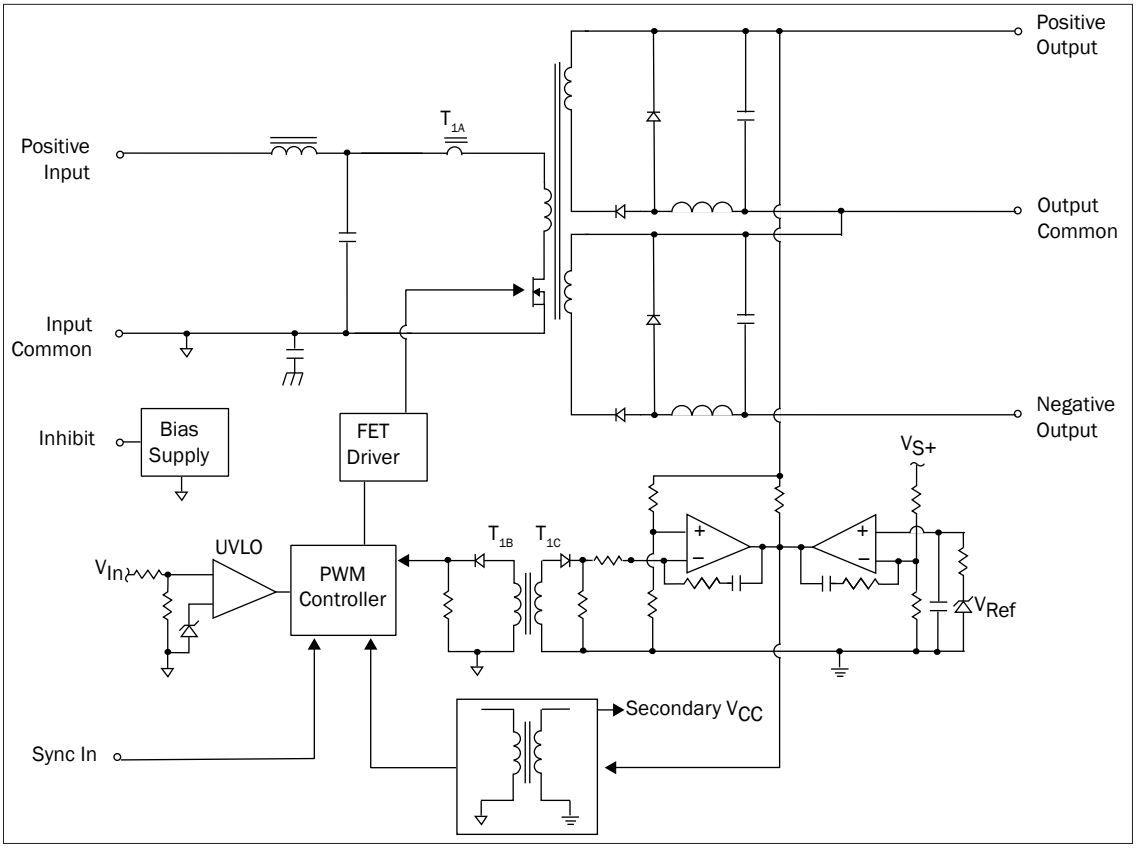


FIGURE 2: MFK DUAL BLOCK DIAGRAM

MFK Single and Dual DC-DC Converters

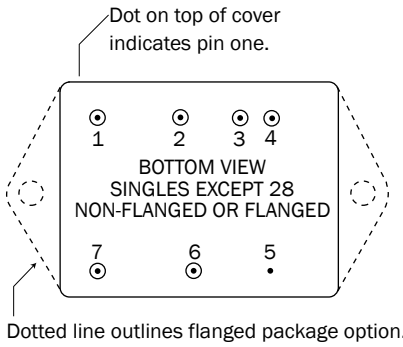
16 TO 50 VOLTS INPUT – 10 TO 25 WATT

PIN OUT			
Pin	**Single Output**	**MFK2828S**	**Dual Output**
1	Inhibit	Inhibit	Inhibit
2	Output Common	Positive Output	Positive Output
3	Positive Output	No Connection	Output Common
4	Sync In	Output Common	Negative Output
5	Case Ground	Sync In	Sync In
6	Input Common	Case Ground	Case Ground
7	Positive Input	Input Common	Input Common
8	—	Positive Input	Positive Input

TABLE 1: PIN OUT

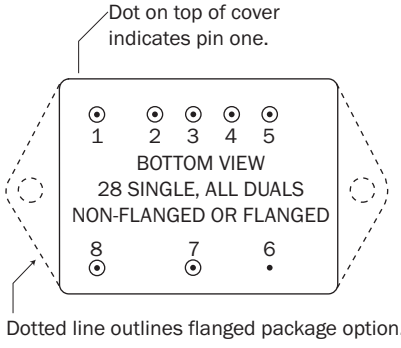
PINS NOT IN USE	
Inhibit	Leave unconnected
Sync	Leave unconnected

TABLE 2: PINS NOT IN USE



See Figure 53 on page 28 and Figure 55 on page 30 for dimensions.

FIGURE 3: MFK SINGLE PIN OUT (EXCEPT 28S)



See Figure 54 on page 29 and Figure 56 on page 31 for dimensions.

FIGURE 4: MFK DUAL PIN OUT (INCLUDES 28S)

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

MODEL NUMBERING KEY

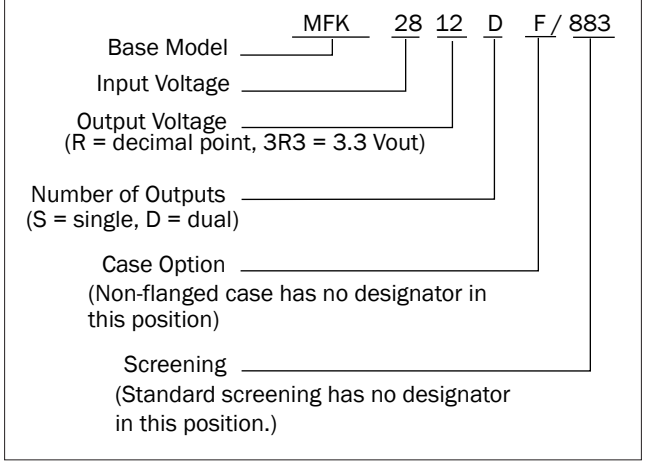


FIGURE 5: MODEL NUMBERING KEY

SMD NUMBERS

STANDARD MICROCIRCUIT DRAWING (SMD)	MFK SIMILAR PART
5962-1421010HXC	MFK281R8S/883
5962-1421011HXC	MFK282R5S/883
5962-1421012HXC	MFK283R3S/883
5962-1421013HXC	MFK2805S/883
5962-1421018HXC	MFK285R2S/883
5962-1421014HXC	MFK285R7S/883
5962-1421015HXC	MFK2812S/883
5962-1421016HXC	MFK2815S/883
5962-1421017HTC	MFK2828S/883
5962-1421109HXC	MFK2805D/883
5962-1421110HXC	MFK2807D/883
5962-1421111HXC	MFK2812D/883
5962-1421112HXC	MFK2815D/883

SMD numbers shown are for screening level Class H, standard case (X), standard pin seal and non-solder dipped pins (C). For other options please refer to the SMD for the SMD number and the vendor similar number. All SMD numbers are listed on the SMD in the "Bulletin" which is the last page of the SMD. For exact specifications for an SMD product, refer to the SMD. SMDs can be downloaded from https://landandmaritimeapps.dla.mil/programs/smcr

TABLE 3: SMD CROSS REFERENCE

MODEL NUMBER OPTIONS

TO DETERMINE THE MODEL NUMBER ENTER ONE OPTION FROM EACH CATEGORY IN THE FORM BELOW.

CATEGORY	Base Model and Input Voltage	Output Voltage [1]	Number of Outputs [2]	Case Options [3]	Screening [4]
OPTIONS	MFK28	1R8, 2R5, 3R3, 05	S	(non-flanged, leave blank) F (flanged)	(standard, leave blank) ES 883
		5R2, 5R7, 12, 15, 28			
		05, 07, 12, 15	D		
FILL IN FOR MODEL # [5]	MFK28	_____	_____	_____	/ _____

Notes
1. Output Voltage: An R indicates a decimal point. 1R8 is 1.8 volts out. The values of 1.8, 2.5, 3.3 and 5.7 volts are only available in single output models.
2. Number of Outputs: S is a single output and D is a dual output.
3. Case Options: For the standard case, Figure 53 on page 28 or Figure 54 on page 29, leave the case option blank. For the flanged case option, Figure 55 on page 30 or Figure 56 on page 31, insert the letter F in the Case Option position.
4. Screening: For standard screening leave the screening option blank. For other screening options, insert the desired screening level. For more information see Table 14 on page 32.
5. If ordering by model number add a "-Q" to request solder dipped leads (MFK2805S/883-Q).

TABLE 4: MODEL NUMBER OPTIONS

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TABLE 5: OPERATING CONDITIONS, ALL MODELS, 25°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

MFK SERIES		ALL MODELS			
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
LEAD SOLDERING TEMPERATURE [1]	10 SECONDS MAX.	—	—	300	°C
STORAGE TEMPERATURE [1]		-65	—	+150	°C
CASE OPERATING TEMPERATURE	FULL POWER	-55	—	+125	°C
	ABSOLUTE [1]	-55	—	+135	
DERATING OUTPUT POWER/CURRENT [1]	LINEARLY	From 100% at 125°C to 0% at 135°C			
ESD RATING [1, 2] MIL-PRF-38534, 3.9.5.8.2	MIL-STD-883, METHOD 3015 CLASS 2	2000 - 3999 [2]			V
ISOLATION: INPUT TO OUTPUT, INPUT TO CASE, OUTPUT TO CASE [3]	500 VDC AT 25°C	100	—	—	Megohms
UNDERVOLTAGE LOCKOUT		—	15	—	V
CURRENT LIMIT [4]	% OF FULL LOAD	—	125	—	%
AUDIO REJECTION [1]		—	50	—	dB
SWITCHING FREQUENCY	-55°C TO +125°C	430	—	570	kHz
SYNCHRONIZATION	INPUT FREQUENCY	450	—	550	kHz
	DUTY CYCLE [1]	40	—	60	%
	ACTIVE LOW	—	—	0.8	V
	ACTIVE HIGH [1]	4.5	—	5.0	
	REFERENCED TO	INPUT COMMON			
	IF NOT USED	LEAVE UNCONNECTED			
INHIBIT ACTIVE LOW (OUTPUT DISABLED) Do not apply a voltage to the inhibit pin [6]	INHIBIT PIN PULLED LOW [5]	—	—	0.8	V
	INHIBIT PIN SOURCE CURRENT [1]	—	—	4	mA
	REFERENCED TO	INPUT COMMON			
INHIBIT ACTIVE HIGH (OUTPUT ENABLED) Do not apply a voltage to the inhibit pin [6]	INHIBIT PIN CONDITION	OPEN COLLECTOR OR UNCONNECTED			
	OPEN PIN VOLTAGE [1]	8.5	—	12	V

For mean time between failures (MTBF) contact Applications Engineering at powerapps@craneae.com

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. Passes 2000 volts.
3. When testing isolation, input pins are tied together and output pins are tied together. They are tested against each other and against case. Discharge the pins before and after testing.
4. Current limit is defined as the point at which the output voltage drops by 1%. Dual outputs: The over-current limit will trigger when the sum of the currents from both outputs reaches 125% (typical value) of the maximum rated “total” current of both outputs.
5. Tested with inhibit pin connected to input common.
6. An external inhibit interface should be used to pull the inhibit low or leave it floating. The inhibit pin can be left unconnected if not used.

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16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TABLE 6: ELECTRICAL CHARACTERISTICS -55°C TO +125°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

SINGLE OUTPUT MODELS		MFK281R8S			MFK282R5S			MFK283R3S			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE		1.74	1.80	1.86	2.42	2.50	2.58	3.20	3.30	3.40	V
OUTPUT CURRENT [2]	V_{IN} = 16 TO 50	–	–	5.56	–	–	5.0	–	–	4.55	A
OUTPUT POWER [2]	V_{IN} = 16 TO 50	–	–	10	–	–	12.5	–	–	15	W
OUTPUT RIPPLE	T_C = 25°C	–	30	60	–	30	60	–	25	60	mV p-p
10 kHz - 20 MHz	T_C = -55°C TO +125°C	–	35	80	–	35	80	–	30	80	
LINE REGULATION	V_{IN} = 16 TO 50	–	5	20	–	5	20	–	5	20	mV
LOAD REGULATION	NO LOAD TO FULL	–	10	25	–	5	25	–	5	25	mV
INPUT VOLTAGE	CONTINUOUS	16	28	50	16	28	50	16	28	50	V
NO LOAD TO FULL	TRANSIENT [1, 3]	–	–	80	–	–	80	–	–	80	
INPUT CURRENT	NO LOAD	–	25	50	–	25	50	–	25	50	mA
	INHIBITED	–	2.5	4	–	2.5	4	–	2.5	4	
INPUT RIPPLE CURRENT	10 kHz - 20 MHz	–	30	75	–	30	80	–	30	80	mA p-p
EFFICIENCY	TC = 25°C	69	72	–	73	76	–	76	79	–	%
	TC = -55°C TO +125°C	67	–	–	71	–	–	74	–	–	
LOAD FAULT [4, 5]	POWER DISSIPATION	–	–	8.5	–	–	8.5	–	–	8.5	W
SHORT CIRCUIT	RECOVERY [1]	–	–	20	–	–	20	–	–	20	ms
STEP LOAD RESPONSE [6, 7]	TRANSIENT	–	±125	±200	–	±125	±200	–	±125	±200	mV pk
50% - 100% - 50%	RECOVERY	–	200	400	–	100	300	–	200	300	µs
STEP LINE RESPONSE [1, 6, 8]	TRANSIENT	–	–	±350	–	–	±350	–	–	±350	mV pk
V_{IN} = 16 - 50 - 16	RECOVERY	–	0.5	1	–	0.5	1	–	0.5	1	ms
START-UP [6, 9]	DELAY	–	–	25	–	–	25	–	–	25	ms
FULL LOAD	OVERSHOOT [1]	–	–	50	–	–	50	–	–	50	mV pk
CAPACITIVE LOAD [1] T_C = 25°C	NO EFFECT ON DC PERFORMANCE	–	–	2000	–	–	2000	–	–	2000	µF

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. At loads <20% of full load, higher input ripple current is possible.
3. The converters provide 80 volt transient protection per MIL-STD-704A.
4. Short circuit measured with 1% 10 milliohm resistive load.
5. Indefinite short circuit protection not guaranteed above 125°C case.
6. Recovery and start-up times are measured from application of the transient or change in condition to the point at which V_{OUT} is within 1% of final value.
7. Step load test is performed at 10 microseconds typical.
8. Step line test is performed at 100 microseconds ± 20 microseconds.
9. Tested on release from inhibit.

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16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TABLE 7: ELECTRICAL CHARACTERISTICS -55°C TO +125°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

SINGLE OUTPUT MODELS		MFK2805S			MFK285R2S			MFK285R7S			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE		4.85	5.00	5.15	5.05	5.2	5.35	5.52	5.70	5.87	V
OUTPUT CURRENT [2]	V_{IN} = 16 TO 50	–	–	4.0	–	–	4	–	–	4.0	A
OUTPUT POWER [2]	V_{IN} = 16 TO 50	–	–	20	–	–	20.8	–	–	22.8	W
OUTPUT RIPPLE	T_C = 25°C	–	40	80	–	40	80	–	40	80	mV p-p
10 kHz - 20 MHz	T_C = -55°C TO +125°C	–	–	100	–	–	100	–	–	100	
LINE REGULATION	V_{IN} = 16 TO 50	–	5	20	–	5	20	–	5	20	mV
LOAD REGULATION	NO LOAD TO FULL	–	5	25	–	5	25	–	5	25	mV
INPUT VOLTAGE	CONTINUOUS	16	28	50	16	28	50	16	28	50	V
NO LOAD TO FULL	TRANSIENT [1, 3]	–	–	80	–	–	80	–	–	80	
INPUT CURRENT	NO LOAD	–	25	50	–	25	50	–	25	50	mA
	INHIBITED	–	2.4	4	–	2.4	4	–	2.4	4	
INPUT RIPPLE CURRENT	10 kHz - 20 MHz	–	23	85	–	23	85	–	25	85	mA p-p
EFFICIENCY	T_C = 25°C	79	82	–	79	82	–	79	82	–	%
	T_C = -55°C TO +125°C	77	–	–	77	–	–	77	–	–	
LOAD FAULT [4, 5]	POWER DISSIPATION	–	6	8.5	–	6	8.5	–	6	8.5	W
SHORT CIRCUIT	RECOVERY [1]	–	–	20	–	–	20	–	–	20	ms
STEP LOAD RESPONSE [6, 7]	TRANSIENT	–	–	±400	–	–	±400	–	–	±400	mV pk
50% - 100% - 50%	RECOVERY	–	–	300	–	–	300	–	–	300	µs
STEP LINE RESPONSE [1, 6, 8]	TRANSIENT	–	–	±500	–	–	±500	–	–	±570	mV pk
V_{IN} = 16 - 50 - 16	RECOVERY	–	0.5	1	–	0.5	1	–	0.5	1	ms
START-UP [6, 9]	DELAY	–	–	25	–	–	25	–	–	25	ms
FULL LOAD	OVERSHOOT [1]	–	0	50	–	0	50	–	0	50	mV pk
CAPACITIVE LOAD [1] T_C = 25°C	NO EFFECT ON DC PERFORMANCE	–	–	2000	–	–	2000	–	–	2000	µF

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. At loads <20% of full load, higher input ripple current is possible.
3. The converters provide 80 volt transient protection per MIL-STD-704A.
4. Short circuit measured with 1% 10 milliohm resistive load.
5. Indefinite short circuit protection not guaranteed above 125°C case.
6. Recovery and start-up times are measured from application of the transient or change in condition to the point at which V_{OUT} is within 1% of final value.
7. Step load test is performed at 10 microseconds typical.
8. Step line test is performed at 100 microseconds ± 20 microseconds.
9. Tested on release from inhibit.

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16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TABLE 8: ELECTRICAL CHARACTERISTICS -55°C TO +125°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

SINGLE OUTPUT MODELS		MFK2812S			MFK2815S			MFK2828S			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE		11.76	12.00	12.24	14.70	15.00	15.30	27.16	28.00	28.84	V
OUTPUT CURRENT [2]	V_{IN} = 16 TO 50	–	–	2.08	–	–	1.67	–	–	0.89	A
OUTPUT POWER [2]	V_{IN} = 16 TO 50	–	–	25	–	–	25	–	–	25	W
OUTPUT RIPPLE	T_C = 25°C	–	35	80	–	40	80	–	80	150	mV p-p
10 kHz - 20 MHz	T_C = -55°C TO +125°C	–	–	100	–	50	100	–	100	200	
LINE REGULATION	V_{IN} = 16 TO 50	–	5	20	–	5	20	–	150	280	mV
LOAD REGULATION	NO LOAD TO FULL	–	5	20	–	5	20	–	150	280	mV
INPUT VOLTAGE	CONTINUOUS	16	28	50	16	28	50	16	28	50	V
NO LOAD TO FULL	TRANSIENT [1, 3]	–	–	80	–	–	80	–	–	80	
INPUT CURRENT	NO LOAD	–	20	50	–	20	50	–	30	55	mA
	INHIBITED	–	2.5	4	–	2.5	4	–	2.5	4	
INPUT RIPPLE CURRENT	10 kHz - 20 MHz	–	45	90	–	50	110	–	50	100	mA p-p
EFFICIENCY	T_C = 25°C	83	86	–	84	87	–	81	84	–	%
	T_C = -55°C TO +125°C	81	–	–	82	–	–	80	–	–	
LOAD FAULT [4, 5]	POWER DISSIPATION	–	6	8.5	–	6	8	–	6	8.5	W
SHORT CIRCUIT	RECOVERY [1]	–	–	20	–	–	20	–	–	20	ms
STEP LOAD RESPONSE [6, 7]	TRANSIENT	–	±350	±500	–	±400	±600	–	±900	±1200	mV pk
50% - 100% - 50%	RECOVERY	–	300	500	–	300	500	–	500	600	µs
STEP LINE RESPONSE [1, 6, 8]	TRANSIENT	–	–	±1300	–	–	±1500	–	–	±2800	mV pk
V_{IN} = 16 - 50 - 16	RECOVERY	–	0.5	1	–	0.5	1	–	0.5	1	ms
START-UP [6, 9]	DELAY	–	–	25	–	–	25	–	–	25	ms
FULL LOAD	OVERSHOOT [1]	–	0	120	–	0	150	–	0	280	mV pk
CAPACITIVE LOAD [1] T_C = 25°C	NO EFFECT ON DC PERFORMANCE	–	–	2000	–	–	2000	–	–	1000	µF

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. At loads <20% of full load, higher input ripple current is possible.
3. The converters provide 80 volt transient protection per MIL-STD-704A.
4. Short circuit measured with 1% 10 milliohm resistive load.
5. Indefinite short circuit protection not guaranteed above 125°C case.
6. Recovery and start-up times are measured from application of the transient or change in condition to the point at which V_{OUT} is within 1% of final value.
7. Step load test is performed at 10 microseconds typical.
8. Step line test is performed at 100 microseconds ± 20 microseconds.
9. Tested on release from inhibit.

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TABLE 9: ELECTRICAL CHARACTERISTICS -55°C TO +125°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

DUAL OUTPUT MODELS		MFK2805D			MFK2807D			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	+ V_{OUT}	4.85	5.00	5.15	6.86	7.00	7.14	V
	- V_{OUT}	4.82	5.00	5.18	6.83	7.00	7.17	
OUTPUT CURRENT [2, 3]	EITHER OUTPUT	—	±2.0	2.80	—	±1.5	2.10	A
V_{IN} = 16 TO 50	TOTAL OUTPUT	—	—	4.0	—	—	3.0	
OUTPUT POWER [2, 3]	EITHER OUTPUT	—	±10	14	—	±10.5	14.7	W
V_{IN} = 16 TO 50	TOTAL OUTPUT	—	—	20	—	—	21	
OUTPUT RIPPLE	T_C = 25°C	—	—	80	—	—	70	mV p-p
±V_{OUT}, 10 kHz - 20 MHz	T_C = -55°C TO +125°C	—	—	90	—	—	80	
END OF LIFE [14, 15]	EOL = -55°C TO +125°C	—	—	155	—	—	135	
LINE REGULATION	+ V_{OUT}	—	5	20	—	5	20	mV
V_{IN} = 16 TO 50	- V_{OUT}	—	20	100	—	20	100	
LOAD REGULATION	+ V_{OUT}	—	5	20	—	5	20	mV
NL TO FULL, BALANCED	- V_{OUT}	—	35	250	—	50	250	
CROSS REGULATION [4]	T_C = 25°C	—	—	360	—	—	400	mV
INPUT VOLTAGE	CONTINUOUS	16	28	50	16	28	50	V
	TRANSIENT [1, 5]	—	—	80	—	—	80	
INPUT CURRENT	NO LOAD	—	30	50	—	30	50	mA
	INHIBITED	—	2.5	4	—	2.5	4	
INPUT RIPPLE CURRENT	10 kHz - 20 MHz	—	35	70	—	35	70	mA p-p
EFFICIENCY	T_C = 25°C	78	81	—	81	83	—	%
	T_C = -55°C TO +125°C	76	—	—	79	—	—	
LOAD FAULT [6, 7]	POWER DISSIPATION	—	6	8.5	—	6	8	W
SHORT CIRCUIT	RECOVERY [1]	—	15	20	—	15	20	ms
STEP LOAD RESPONSE [8, 9, 10]	TRANSIENT ±V_{OUT}	—	±100	±450	—	±125	±500	mV pk
50%-100%-50%, BALANCED LOADS	RECOVERY	—	200	500	—	200	500	µs
STEP LINE RESPONSE [1, 8, 11]	TRANSIENT	—	—	±500	—	—	±700	mV pk
V_{IN} = 16 - 50 - 16, ±V_{OUT},	RECOVERY	—	0.5	1	—	0.5	1	ms
START-UP [8, 12]	DELAY	—	—	20	—	—	20	ms
	OVERSHOOT [1]	—	0	50	—	0	70	mV pk
CAPACITIVE LOAD [1, 13]	NO EFFECT ON DC	—	—	1000	—	—	1000	µF
T_C = 25°C	PERFORMANCE							

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. Up to 70% of the total output power is available from either output providing the opposite output is simultaneously carrying 30% of the total output power.
3. At loads <20% of full load, higher input ripple current is possible (sum of both outputs).
4. Effect on –Vout for the following conditions:
   +Po = 30% to 70%; - Po = 70% to 30%
5. The converters provide 80 volt transient protection per MIL-STD-704A.
6. Short circuit measured with 1% 10 milliohm resistive load.
7. Indefinite short circuit protection not guaranteed above 125°C case.
8. Recovery and start-up times are measured from application of the transient or change in condition to the point at which V_{OUT} is within 1% of final value.
9. Response of either output with the opposite output held at half of the total output power.
10. Step load test is performed at 10 microseconds typical.
11. Step line test is performed at 100 microseconds ± 20 microseconds.
12. Tested on release from inhibit.
13. Each output.
14. End of Life performance meets standard datasheet limits unless specific EOL limits are given for a parameter.
15. End of Life limits are not tested during production. These values are determined by worst case analysis and includes aging.

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TABLE 10: ELECTRICAL CHARACTERISTICS -55°C TO +125°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

DUAL OUTPUT MODELS		MFK2812D			MFK2815D			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	+ V_{OUT}	11.76	12.00	12.24	14.70	15.00	15.30	V
	- V_{OUT}	11.70	12.00	12.30	14.63	15.00	15.38	
OUTPUT CURRENT [2, 3]	EITHER OUTPUT	—	±1.04	1.45	—	±0.833	1.16	A
V_{IN} = 16 TO 50	TOTAL OUTPUT	—	—	2.08	—	—	1.66	
OUTPUT POWER [2, 3]	EITHER OUTPUT	—	±12.5	17.5	—	±12.5	17.5	W
V_{IN} = 16 TO 50	TOTAL OUTPUT	—	—	25	—	—	25	
OUTPUT RIPPLE	T_C = 25°C	—	—	90	—	—	90	mV p-p
±V_{OUT}, 10 kHz - 20 MHz	T_C = -55°C TO +125°C	—	—	90	—	—	90	
END OF LIFE [14, 15]	EOL= -55°C TO +125°C	—	—	200	—	—	200	
LINE REGULATION	+ V_{OUT}	—	5	20	—	5	20	mV
V_{IN} = 16 TO 50	- V_{OUT}	—	20	150	—	20	150	
LOAD REGULATION	+ V_{OUT}	—	5	20	—	5	20	mV
NL TO FULL, BALANCED	- V_{OUT}	—	60	250	—	100	250	
CROSS REGULATION [4]	T_C = 25°C	—	—	700	—	—	800	mV
INPUT VOLTAGE	CONTINUOUS	16	28	50	16	28	50	V
	TRANSIENT [1, 5]	—	—	80	—	—	80	
INPUT CURRENT	NO LOAD	—	30	50	—	30	50	mA
	INHIBITED	—	2.5	4	—	2.5	4	
INPUT RIPPLE CURRENT	10 kHz - 20 MHz	—	50	100	—	40	100	mA p-p
EFFICIENCY	T_C = 25°C	82	85	—	83	86	—	%
	T_C = -55°C TO +125°C	80	—	—	81	—	—	
LOAD FAULT [6, 7]	POWER DISSIPATION	—	5	8	—	5	8	W
SHORT CIRCUIT	RECOVERY [1]	—	15	20	—	15	20	ms
STEP LOAD RESPONSE [8, 9, 10]	TRANSIENT ±V_{OUT}	—	±350	±600	—	±400	±650	mV pk
50%-100%-50%, BALANCED LOADS	RECOVERY	—	250	550	—	250	550	µs
STEP LINE RESPONSE [1, 8, 11]	TRANSIENT	—	—	±1300	—	—	±1500	mV pk
V_{IN} = 16 - 50 - 16, ±V_{OUT},	RECOVERY	—	0.5	1	—	0.5	1	ms
START-UP [8, 12]	DELAY	—	—	20	—	—	20	ms
	OVERSHOOT [1]	—	0	120	—	0	150	mV pk
CAPACITIVE LOAD [1, 13]	NO EFFECT ON DC	—	—	1000	—	—	1000	µF
T_C = 25°C	PERFORMANCE							

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. Up to 70% of the total output power is available from either output providing the opposite output is simultaneously carrying 30% of the total output power.
3. At loads <20% of full load, higher input ripple current is possible (sum of both outputs).
4. Effect on –Vout for the following conditions:
   +Po = 30% to 70%; - Po = 70% to 30%
5. The converters provide 80 volt transient protection per MIL-STD-704A.
6. Short circuit measured with 1% 10 milliohm resistive load.
7. Indefinite short circuit protection not guaranteed above 125°C case.
8. Recovery and start-up times are measured from application of the transient or change in condition to the point at which V_{OUT} is within 1% of final value. C_L = 0.
9. Response of either output with the opposite output held at half of the total output power.
10. Step load test is performed at 10 microseconds typical.
11. Step line test is performed at 100 microseconds ± 20 microseconds.
12. Tested on release from inhibit.
13. Each output.
14. End of Life performance meets standard datasheet limits unless specific EOL limits are given for a parameter.
15. End of Life limits are not tested during production. These values are determinded by worst case analysis and includes aging.

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TABLE 11: OPERATING CONDITIONS, ALL MODELS, 25°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

MFK SERIES		ALL MODELS			
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
LEAD SOLDERING TEMPERATURE [1]	10 SECONDS MAX.	—	—	300	°C
STORAGE TEMPERATURE [1]		-65	—	+150	°C
CASE OPERATING TEMPERATURE	FULL POWER	-55	—	+125	°C
	ABSOLUTE [1]	-55	—	+135	
DERATING OUTPUT POWER/CURRENT [1]	LINEARLY	From 100% at 125°C to 0% at 135°C			
ESD RATING [1, 2] MIL-PRF-38534, 3.9.5.8.2	MIL-STD-883, METHOD 3015 CLASS 2	2000 - 3999 [2]			V
ISOLATION: INPUT TO OUTPUT, INPUT TO CASE, OUTPUT TO CASE [3]	500 VDC AT 25°C	100	—	—	Megohms
UNDERVOLTAGE LOCKOUT		—	15	—	V
CURRENT LIMIT [4]	% OF FULL LOAD	—	125	—	%
AUDIO REJECTION [1]		—	50	—	dB
SWITCHING FREQUENCY	-55°C TO +125°C	430	—	570	kHz
SYNCHRONIZATION	INPUT FREQUENCY	450	—	550	kHz
	DUTY CYCLE [1]	40	—	60	%
	ACTIVE LOW	—	—	0.8	V
	ACTIVE HIGH [1]	4.5	—	5.0	
	REFERENCED TO	INPUT COMMON			
	IF NOT USED	LEAVE UNCONNECTED			
INHIBIT ACTIVE LOW (OUTPUT DISABLED) Do not apply a voltage to the inhibit pin [6]	INHIBIT PIN PULLED LOW [5]	—	—	0.8	V
	INHIBIT PIN SOURCE CURRENT [1]	—	—	4	mA
	REFERENCED TO	INPUT COMMON			
INHIBIT ACTIVE HIGH (OUTPUT ENABLED) Do not apply a voltage to the inhibit pin [6]	INHIBIT PIN CONDITION	OPEN COLLECTOR OR UNCONNECTED			
	OPEN PIN VOLTAGE [1]	8.5	—	12	V

For mean time between failures (MTBF) contact Applications Engineering at powerapps@craneae.com

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. Passes 2000 volts.
3. When testing isolation, input pins are tied together and output pins are tied together. They are tested against each other and against case. Discharge the pins before and after testing.
4. Current limit is defined as the point at which the output voltage drops by 1%. Dual outputs: The over-current limit will trigger when the sum of the currents from both outputs reaches 125% (typical value) of the maximum rated “total” current of both outputs.
5. Tested with inhibit pin connected to input common.
6. An external inhibit interface should be used to pull the inhibit low or leave it floating. The inhibit pin can be left unconnected if not used.

42 volt specifications are for reference only and are not guaranteed.

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TABLE 12: ELECTRICAL CHARACTERISTICS -55°C TO +125°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

SINGLE OUTPUT MODELS		MFK2805S			MFK2812S			MFK2815S			UNITS
PARAMETER [1]	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE		4.85	5.00	5.15	11.76	12.00	12.24	14.70	15.00	15.30	V
OUTPUT CURRENT [2]	V_{IN} = 16 TO 50	—	—	4.0	—	—	2.08	—	—	1.67	A
OUTPUT POWER [2]	V_{IN} = 16 TO 50	—	—	20	—	—	25	—	—	25	W
OUTPUT RIPPLE	T_C = 25°C	—	52	80	—	50	80	—	47	80	mV p-p
10 kHz - 20 MHz	T_C = -55°C TO +125°C	—	59	100	—	64	100	—	55	100	
LINE REGULATION	V_{IN} = 16 TO 50	—	5	20	—	5	20	—	5	20	mV
LOAD REGULATION	NO LOAD TO FULL	—	6	25	—	5	20	—	5	20	mV
INPUT VOLTAGE	CONTINUOUS	16	42	50	16	42	50	16	42	50	V
NO LOAD TO FULL	TRANSIENT [1, 3]	—	—	80	—	—	80	—	—	80	
INPUT CURRENT	NO LOAD	—	20	50	—	16	50	—	15	50	mA
	INHIBITED	—	2.7	4	—	2.7	4	—	3.0	4	
INPUT RIPPLE CURRENT	10 kHz - 20 MHz	—	25	105	—	30	110	—	35	120	mA p-p
EFFICIENCY	T_C = 25°C	78	81	—	82	85	—	83	86	—	%
	T_C = -55°C TO +125°C	76	—	—	80	—	—	81	—	—	
LOAD FAULT [4, 5]	POWER DISSIPATION	—	7	8.5	—	7	8.5	—	7	8	W
SHORT CIRCUIT	RECOVERY	—	—	20	—	—	20	—	—	20	ms
STEP LOAD RESPONSE [6, 7]	TRANSIENT	—	±110	±400	—	±320	±500	—	±375	±600	mV pk
50% - 100% - 50%	RECOVERY	—	205	300	—	250	500	—	240	500	µs
STEP LINE RESPONSE [6, 8]	TRANSIENT	—	—	±500	—	—	±1300	—	—	±1500	mV pk
V_{IN} = 16 - 50 - 16	RECOVERY	—	0.5	1	—	0.5	1	—	0.5	1	ms
START-UP [6, 9]	DELAY	—	—	25	—	—	25	—	—	25	ms
FULL LOAD	OVERSHOOT	—	0	50	—	0	120	—	0	150	mV pk
CAPACITIVE LOAD T_C = 25°C	NO EFFECT ON DC PERFORMANCE	—	—	2000	—	—	2000	—	—	2000	µF

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. At loads <20% of full load, higher input ripple current is possible.
3. The converters provide 80 volt transient protection per MIL-STD-704A.
4. Short circuit measured with 1% 10 milliohm resistive load.
5. Indefinite short circuit protection not guaranteed above 125°C case.
6. Recovery and start-up times are measured from application of the transient or change in condition to the point at which V_{OUT} is within 1% of final value. C_L = 0.
7. Step load test is performed at 10 microseconds typical.
8. Step line test is performed at 100 microseconds ± 20 microseconds.
9. Tested on release from inhibit.

42 volt specifications are for reference only and are not guaranteed.

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

15. TABLE 13: ELECTRICAL CHARACTERISTICS -55°C TO +125°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

DUAL OUTPUT MODELS		MFK2812D			MFK2815D			UNITS
PARAMETER [1]	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	+ V_{OUT}	11.76	12.00	12.24	14.70	15.00	15.30	V
	- V_{OUT}	11.70	12.00	12.30	14.63	15.00	15.38	
OUTPUT CURRENT [2, 3]	EITHER OUTPUT	—	±1.04	1.45	—	±0.833	1.16	A
V_{IN} = 16 TO 50	TOTAL OUTPUT	—	—	2.08	—	—	1.66	
OUTPUT POWER [2, 3]	EITHER OUTPUT	—	±12.5	17.5	—	±12.5	17.5	W
V_{IN} = 16 TO 50	TOTAL OUTPUT	—	—	25	—	—	25	
OUTPUT RIPPLE	T_C = 25°C	—	—	90	—	—	90	mV p-p
±V_{OUT}, 10 kHz - 20 MHz	T_C = -55°C TO +125°C	—	—	90	—	—	90	
END OF LIFE [14, 15]	EOL = -55°C TO +125°C	—	—	200	—	—	200	
LINE REGULATION	+ V_{OUT}	—	5	20	—	5	20	mV
V_{IN} = 16 TO 50 V	- V_{OUT}	—	20	150	—	20	150	
LOAD REGULATION	+ V_{OUT}	—	5	20	—	5	20	mV
NL TO FULL, BALANCED	- V_{OUT}	—	20	250	—	60	250	
CROSS REGULATION [4]	T_C = 25°C	—	—	700	—	—	800	mV
INPUT VOLTAGE	CONTINUOUS	16	42	50	16	42	50	V
	TRANSIENT [1, 5]	—	—	80	—	—	80	
INPUT CURRENT	NO LOAD	—	22	50	—	25	50	mA
	INHIBITED	—	2.8	4	—	2.8	4	
INPUT RIPPLE CURRENT	10 kHz - 20 MHz	—	30	120	—	35	120	mA p-p
EFFICIENCY	T_C = 25°C	81	84	—	82	85	—	%
	T_C = -55°C TO +125°C	79	—	—	80	—	—	
LOAD FAULT [6, 7]	POWER DISSIPATION	—	7.5	8.5	—	7.5	8.5	W
SHORT CIRCUIT	RECOVERY	—	15	20	—	15	20	ms
STEP LOAD RESPONSE [8, 9, 10]	TRANSIENT +V_{OUT}	—	±320	±600	—	±365	±650	mV pk
50%-100%-50%, BALANCED LOADS	RECOVERY	—	240	550	—	250	550	µs
STEP LINE RESPONSE [8, 11]	TRANSIENT	—	—	±1300	—	—	±1500	mV pk
V_{IN} = 16 - 50 - 16, ±V_{OUT}	RECOVERY	—	0.5	1	—	0.5	1	ms
START-UP [8, 12]	DELAY	—	—	20	—	—	20	ms
	OVERSHOOT	—	0	120	—	0	150	mV pk
CAPACITIVE LOAD [13]	NO EFFECT ON DC	—	—	1000	—	—	1000	µF
T_C = 25°C	PERFORMANCE							

Notes
1. Guaranteed by characterization test and/or analysis. Not a production test.
2. Up to 70% of the total output power is available from either output providing the opposite output is simultaneously carrying 30% of the total output power.
3. At loads <20% of full load, higher input ripple current is possible (sum of both outputs).
4. Effect on –Vout for the following conditions:
   +Po = 30% to 70%; - Po = 70% to 30%
5. The converters provide 80 volt transient protection per MIL-STD-704A.
6. Short circuit measured with 1% 10 milliohm resistive load.
7. Indefinite short circuit protection not guaranteed above 125°C case.
8. Recovery and start-up times are measured from application of the transient or change in condition to the point at which V_{OUT} is within 1% of final value. C_L = 0.
9. Response of either output with the opposite output held at half of the total output power.
10. Step load test is performed at 10 microseconds typical.
11. Step line test is performed at 100 microseconds ± 20 microseconds.
12. Tested on release from inhibit.
13. Each output.
14. End of Life performance meets standard datasheet limits unless specific EOL limits are given for a parameter.
15. End of Life limits are not tested during production. These values are determinded by worst case analysis and includes aging.

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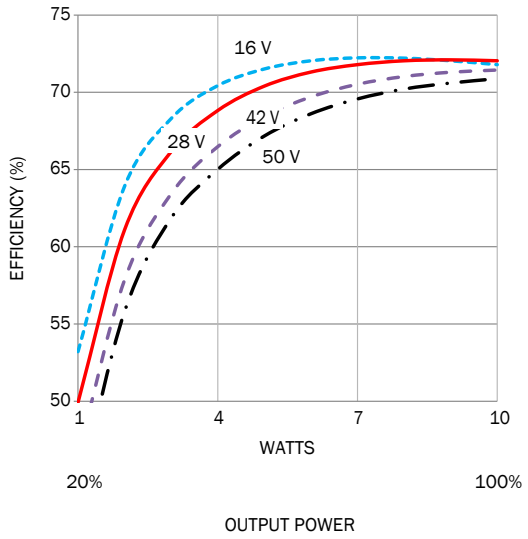
MFK Single and Dual DC-DC Converters

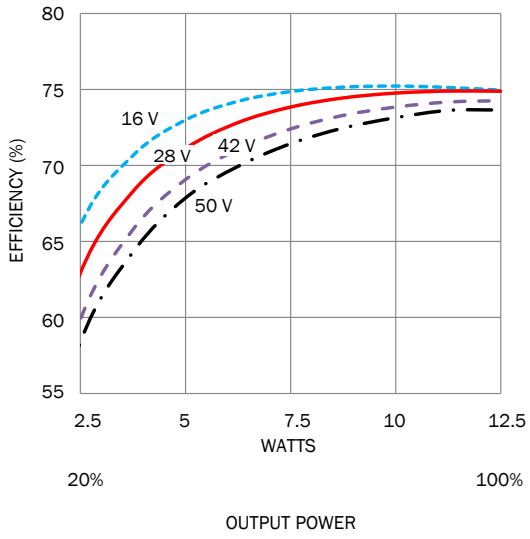
16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TYPICAL PERFORMANCE PLOTS: 25°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



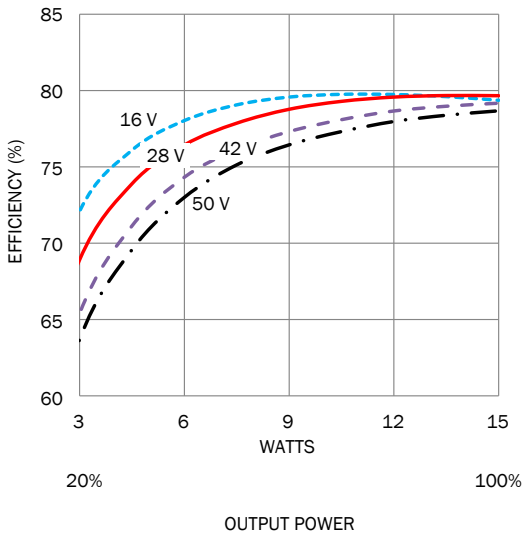
MFK281R8S EFFICIENCY

FIGURE 6



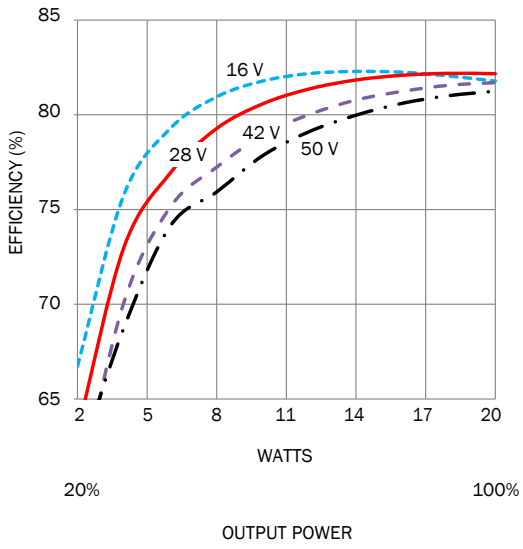
MFK282R5S EFFICIENCY

FIGURE 7



MFK283R3S EFFICIENCY

FIGURE 8



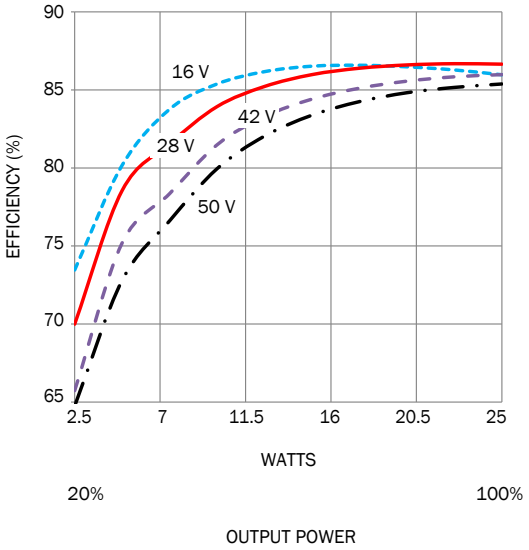
MFK2805S EFFICIENCY

FIGURE 9

MFK Single and Dual DC-DC Converters

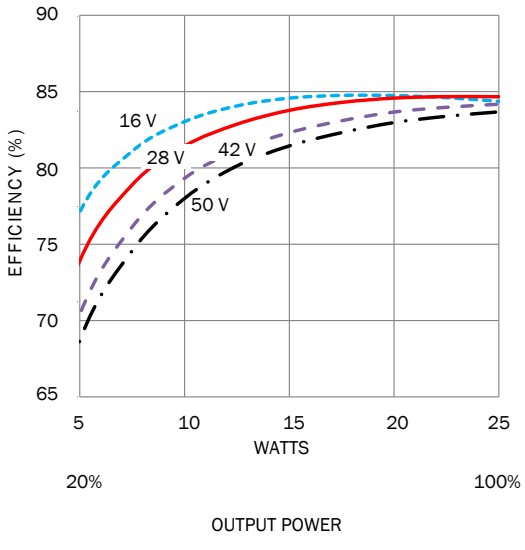
16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TYPICAL PERFORMANCE PLOTS: 25°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



MFK2812S EFFICIENCY

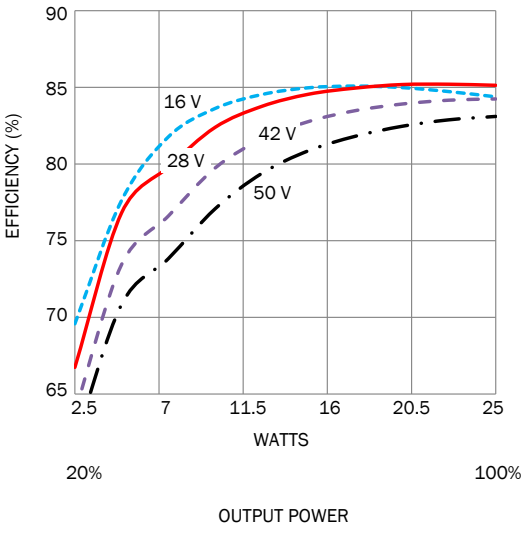
FIGURE 10



MFK2815S EFFICIENCY

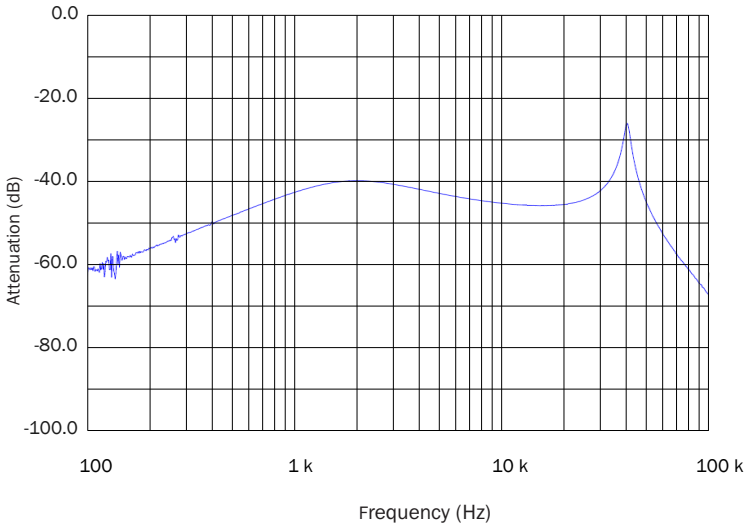
FIGURE 11

MFK285R7S Efficiency will be added in the future.



MFK2828S EFFICIENCY

FIGURE 12



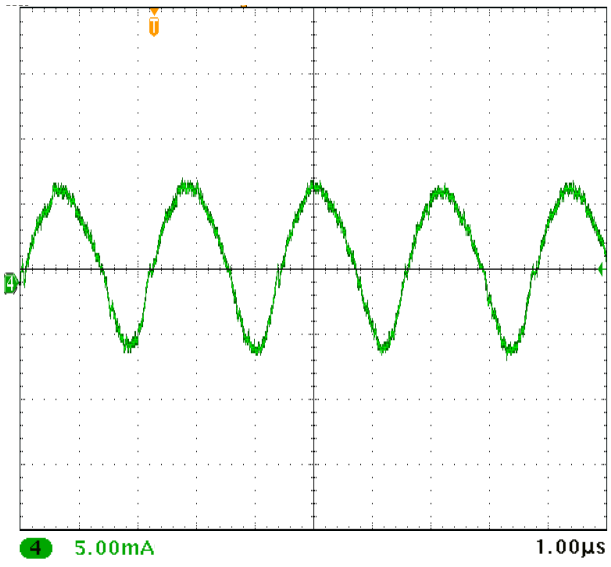
MFK SINGLE AUDIO REJECTION

FIGURE 13

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

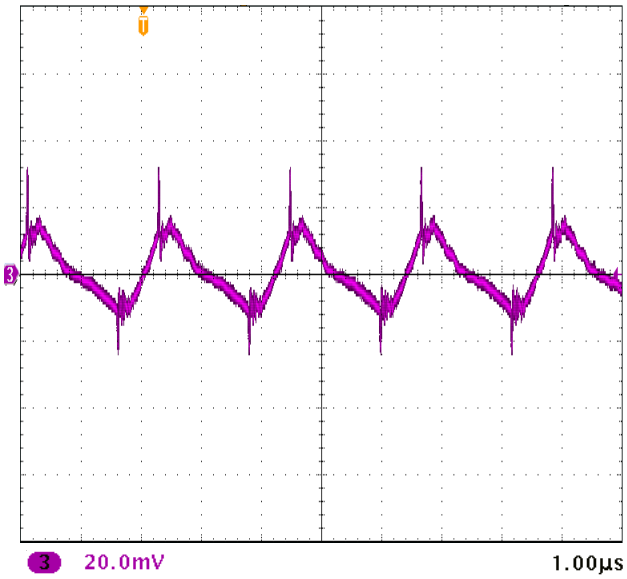
TYPICAL PERFORMANCE PLOTS: 25°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



UNITS ARE PER DIVISION

MFK2805S INPUT RIPPLE

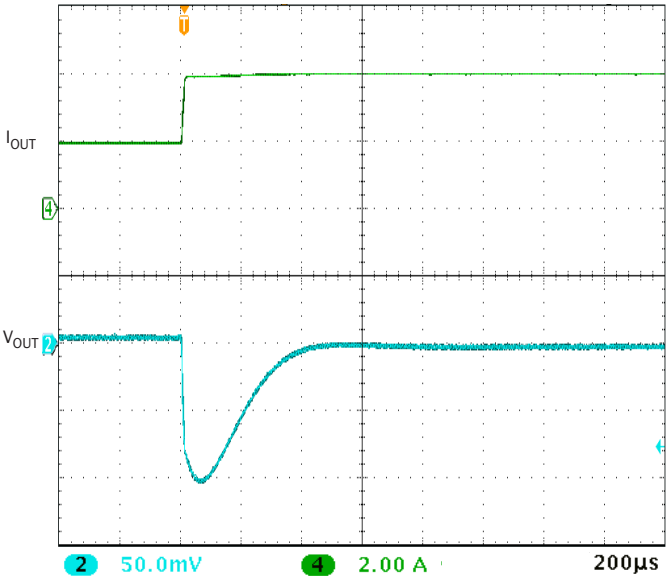
FIGURE 14



UNITS ARE PER DIVISION

MFK2805S OUTPUT RIPPLE

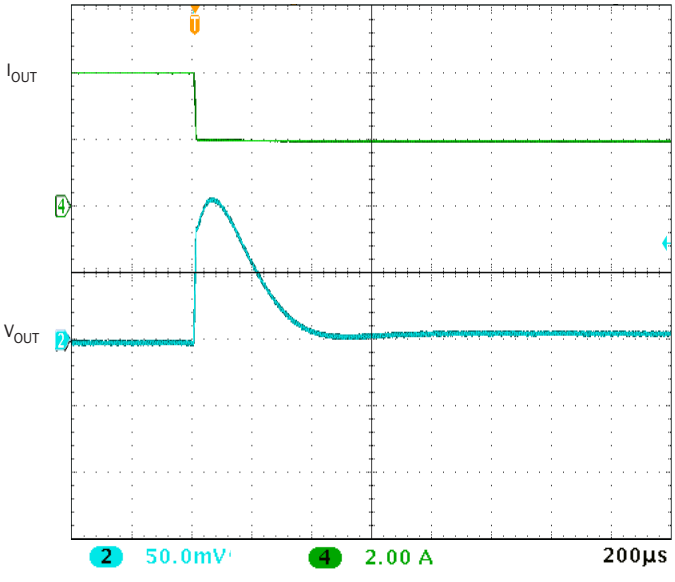
FIGURE 15



UNITS ARE PER DIVISION

MFK2805S STEP LOAD 50% - 100%

FIGURE 16

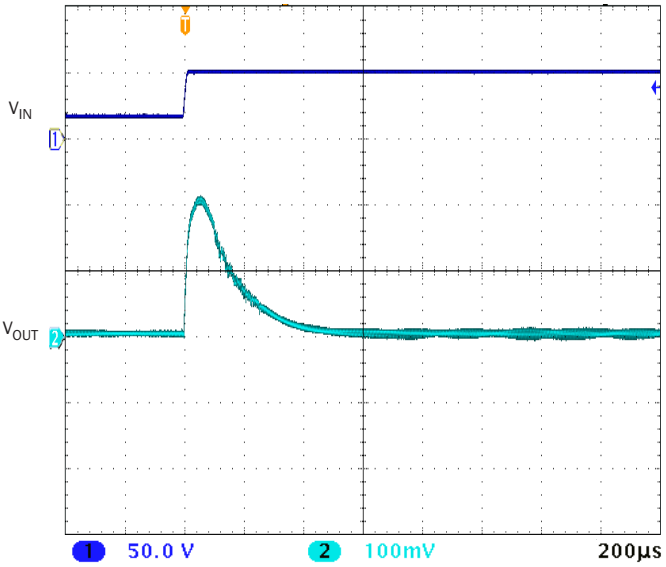


UNITS ARE PER DIVISION

MFK2805S STEP LOAD 100% - 50%

FIGURE 17

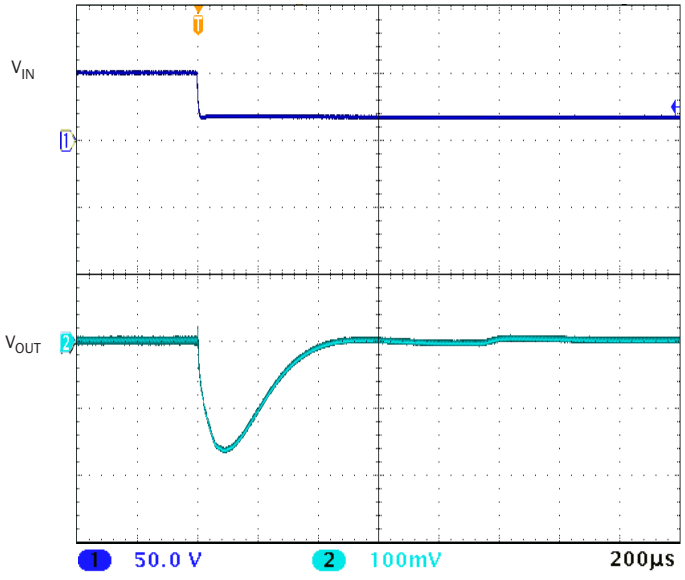
TYPICAL PERFORMANCE PLOTS: 25°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



UNITS ARE PER DIVISION

MFK2805S STEP LINE 16 - 50 VOLTS 50% LOAD

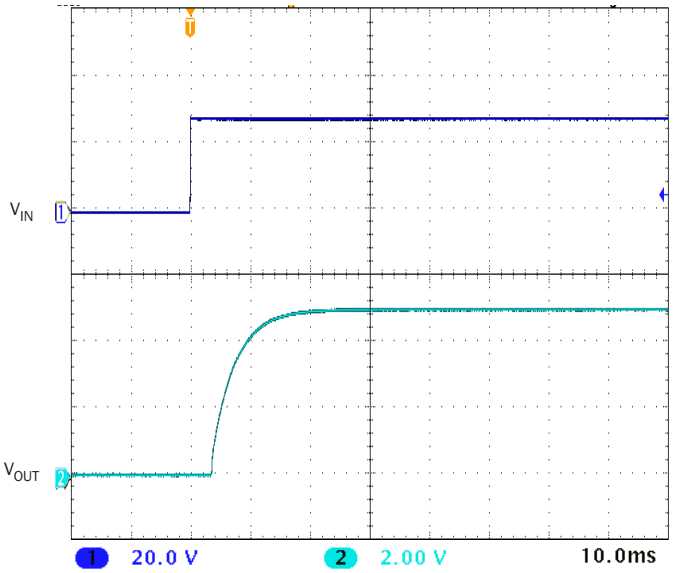
FIGURE 18



UNITS ARE PER DIVISION

MFK2805S STEP LINE 50 - 16 VOLTS 50% LOAD

FIGURE 19



UNITS ARE PER DIVISION

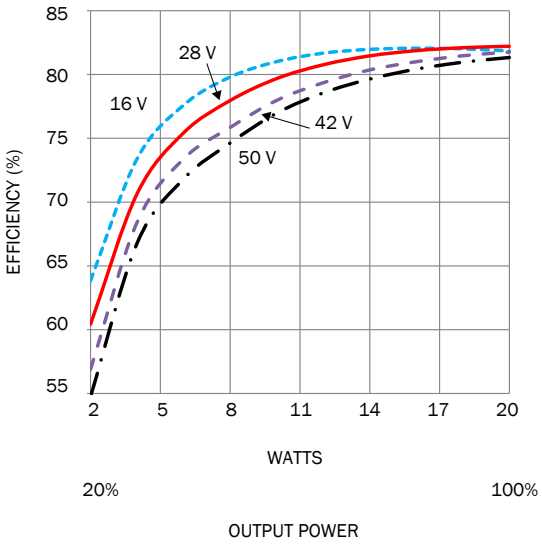
MFK2805S START-UP FULL LOAD

FIGURE 20

MFK Single and Dual DC-DC Converters

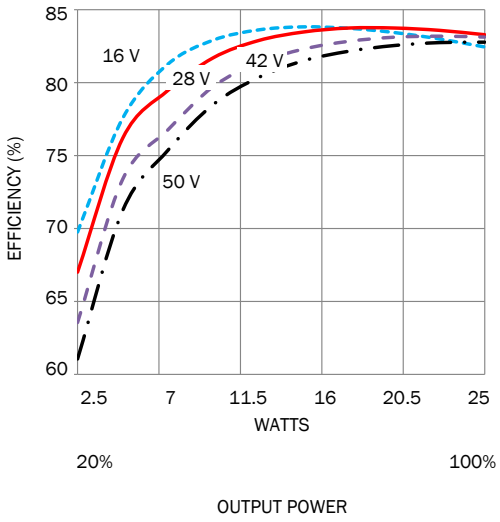
16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TYPICAL PERFORMANCE PLOTS: 25°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



MFK2805D EFFICIENCY

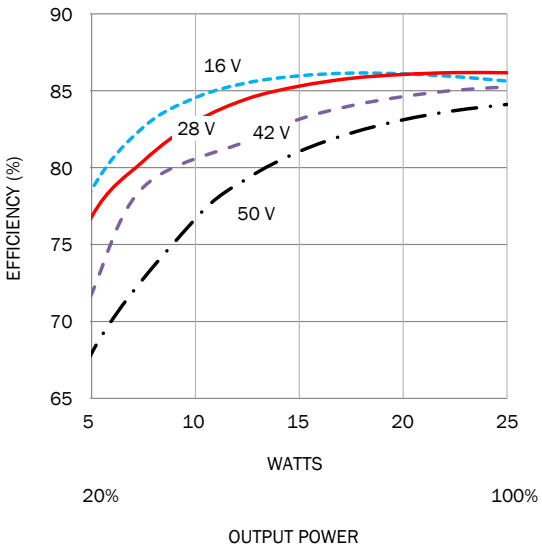
FIGURE 21



MFK2812D EFFICIENCY

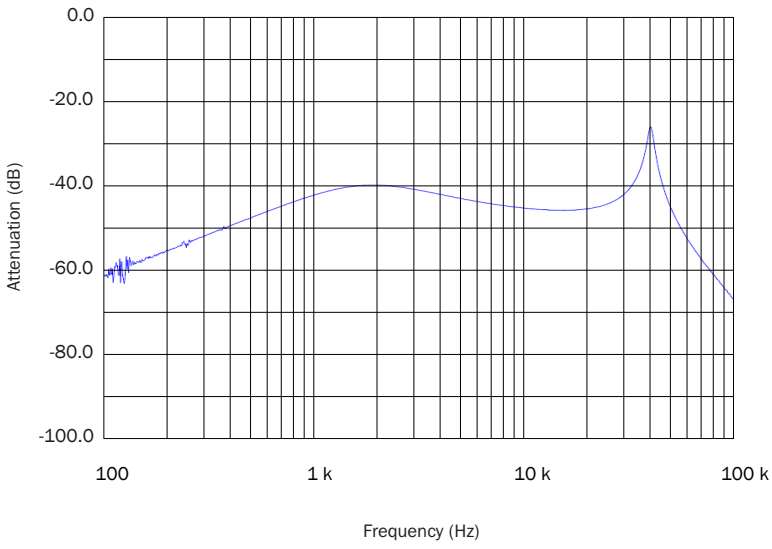
FIGURE 22

MFK2807D Efficiency will be added in the future.



MFK2815D EFFICIENCY

FIGURE 23



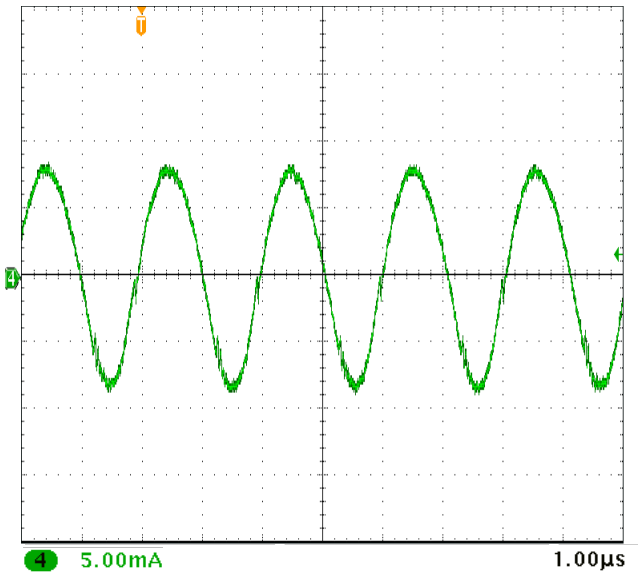
MFK DUAL AUDIO REJECTION

FIGURE 24

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

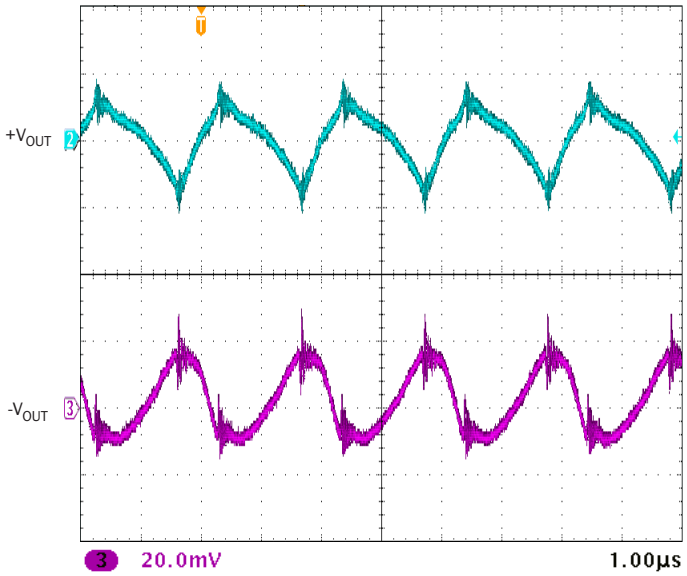
TYPICAL PERFORMANCE PLOTS: 25°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



UNITS ARE PER DIVISION

MFK2815D INPUT RIPPLE

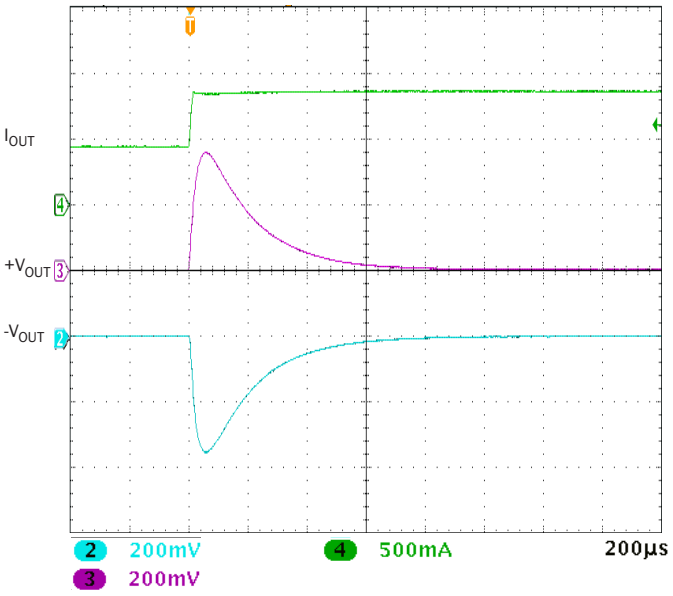
FIGURE 25



UNITS ARE PER DIVISION

MFK2815D OUTPUT RIPPLE

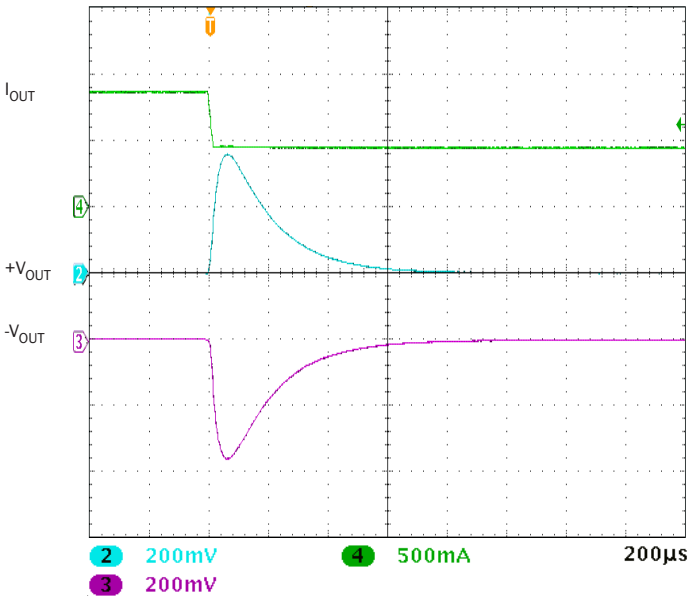
FIGURE 26



UNITS ARE PER DIVISION

MFK2815D STEP LOAD 50% - 100%

FIGURE 27



UNITS ARE PER DIVISION

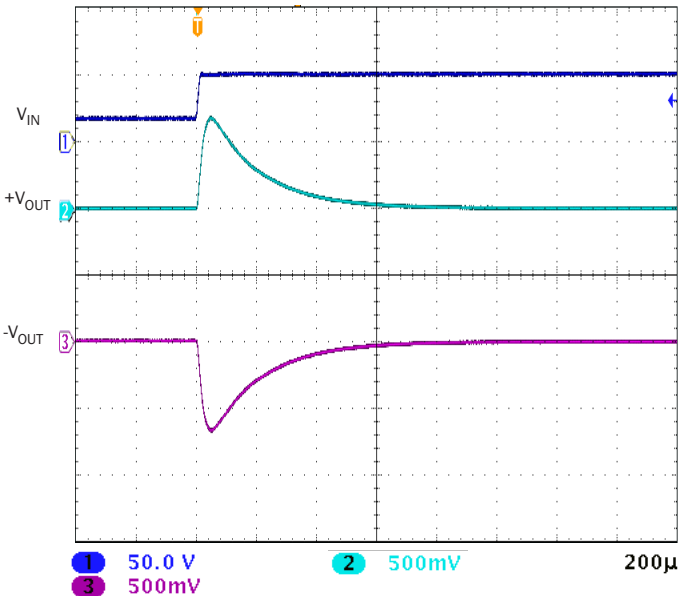
MFK2815D STEP LOAD 100% - 50%

FIGURE 28

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

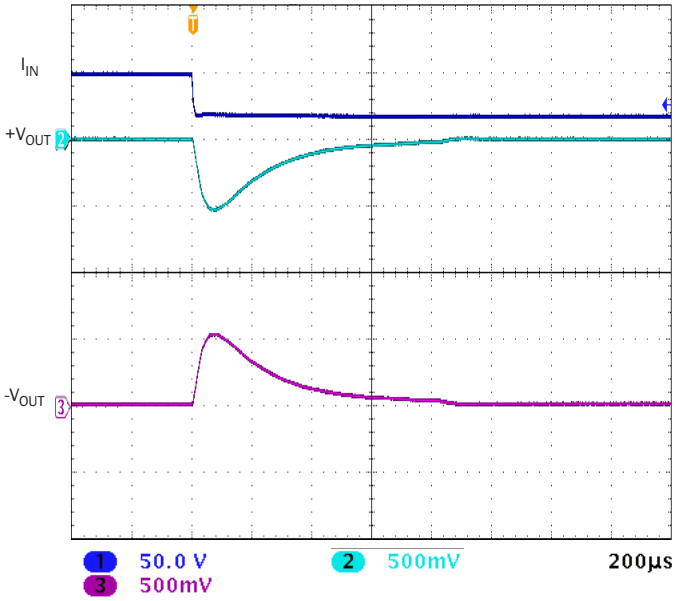
TYPICAL PERFORMANCE PLOTS: 25°C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



UNITS ARE PER DIVISION

MFK2815D STEP LINE 16 - 50 VOLTS 50% LOAD

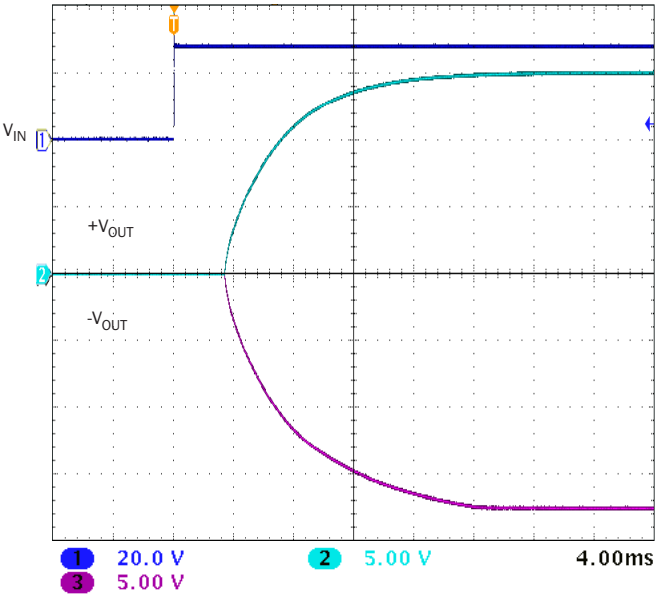
FIGURE 29



UNITS ARE PER DIVISION

MFK2815D STEP LINE 50 - 16 VOLTS 50% LOAD

FIGURE 30



UNITS ARE PER DIVISION

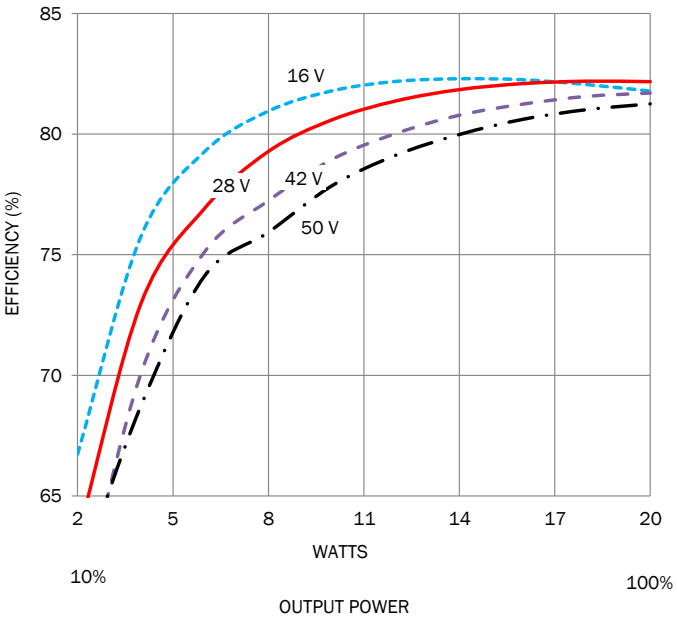
MFK2815D START-UP FULL LOAD

FIGURE 31

MFK Single and Dual DC-DC Converters

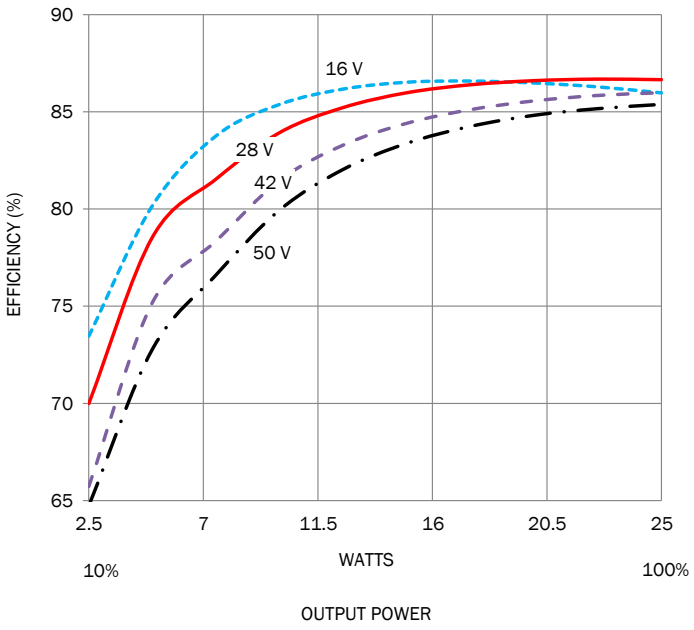
16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TYPICAL PERFORMANCE PLOTS: 25°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



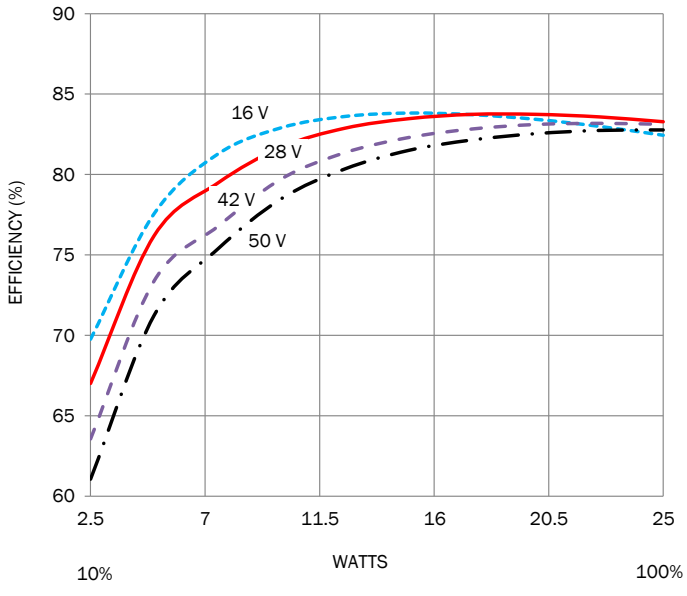
MFK2805S EFFICIENCY

FIGURE 32



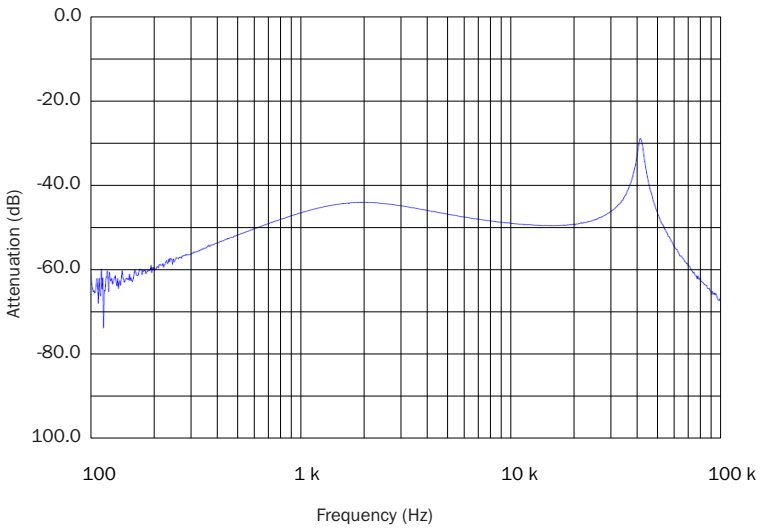
MFK2812S EFFICIENCY

FIGURE 33



MFK2815S EFFICIENCY

FIGURE 34



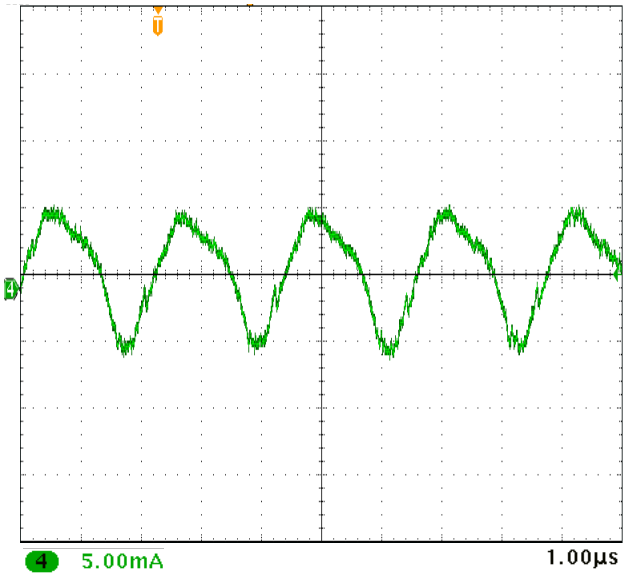
MFK SINGLE AUDIO REJECTION

FIGURE 35

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

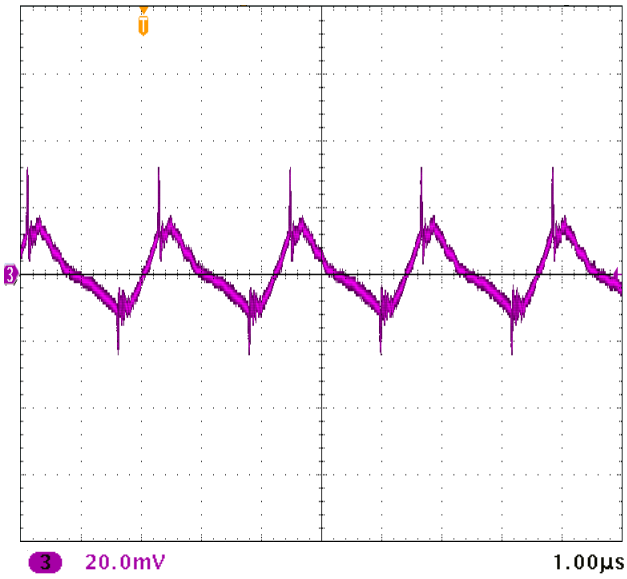
TYPICAL PERFORMANCE PLOTS: 25°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



UNITS ARE PER DIVISION

MFK2805S INPUT RIPPLE

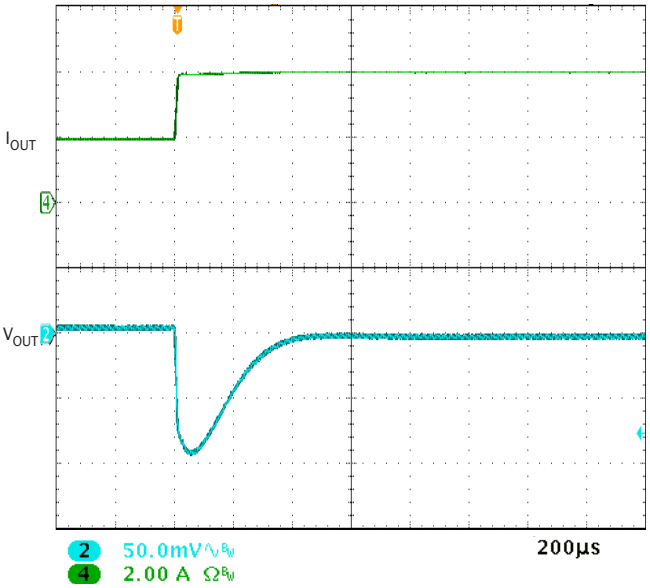
FIGURE 36



UNITS ARE PER DIVISION

MFK2805S OUTPUT RIPPLE

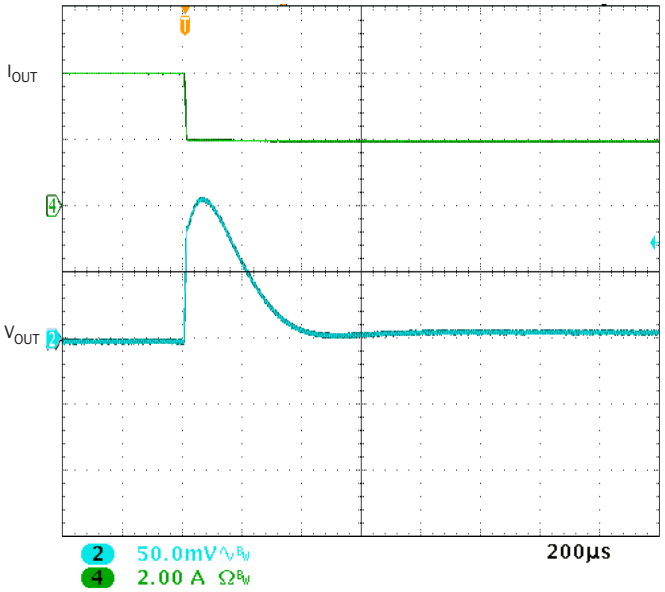
FIGURE 37



UNITS ARE PER DIVISION

MFK2805S STEP LOAD 50% - 100%

FIGURE 38



UNITS ARE PER DIVISION

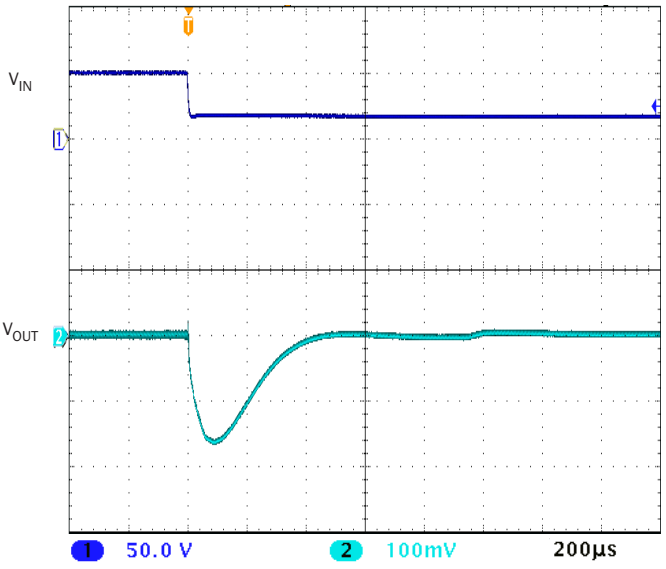
MFK2805S STEP LOAD 100% - 50%

FIGURE 39

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

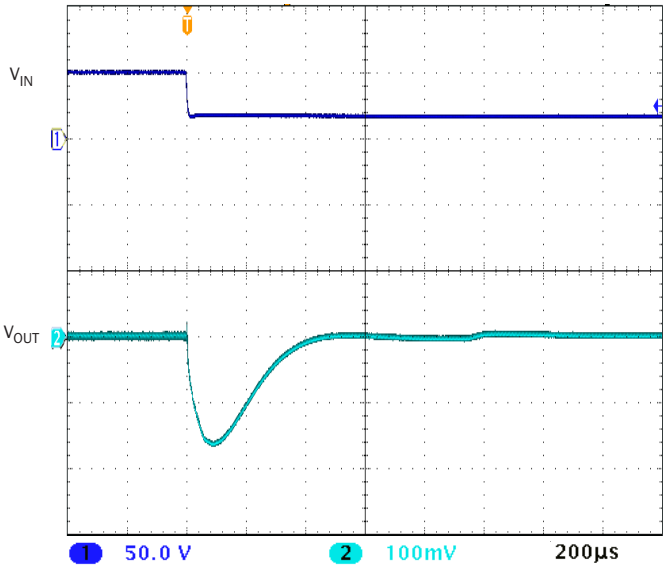
TYPICAL PERFORMANCE PLOTS: 25°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



UNITS ARE PER DIVISION

MFK2805S STEP LINE 16 - 50 VOLTS 50% LOAD

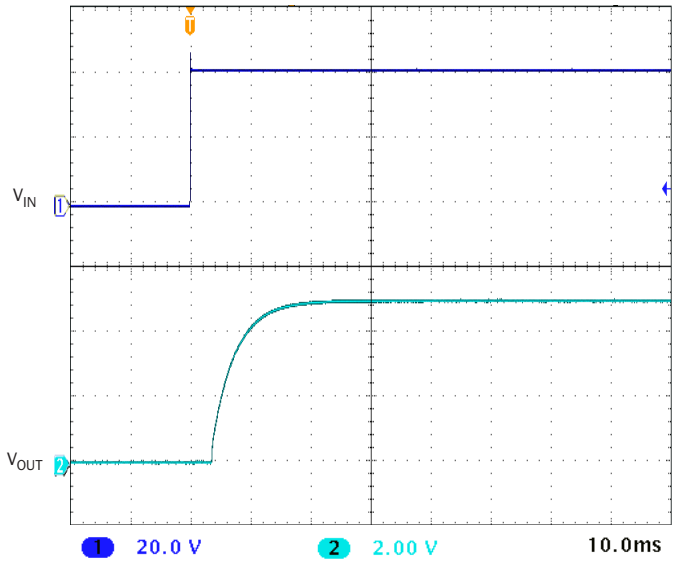
FIGURE 41



UNITS ARE PER DIVISION

MFK2805S STEP LINE 50 - 16 VOLTS 50% LOAD

FIGURE 40



UNITS ARE PER DIVISION

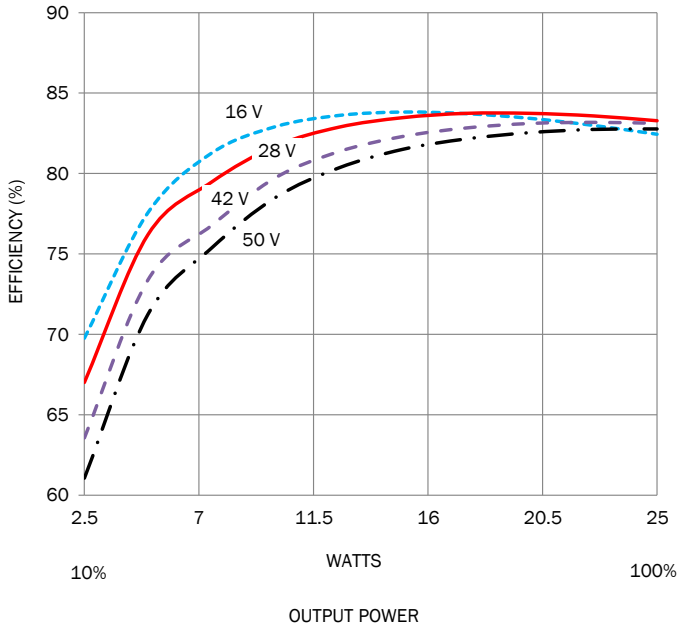
MFK2805S START-UP FULL LOAD

FIGURE 42

MFK Single and Dual DC-DC Converters

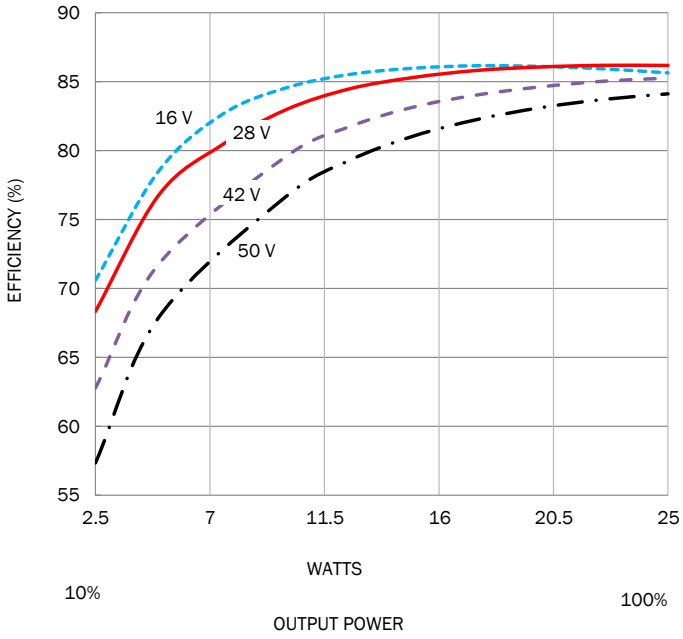
16 TO 50 VOLTS INPUT – 10 TO 25 WATT

TYPICAL PERFORMANCE PLOTS: 25°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



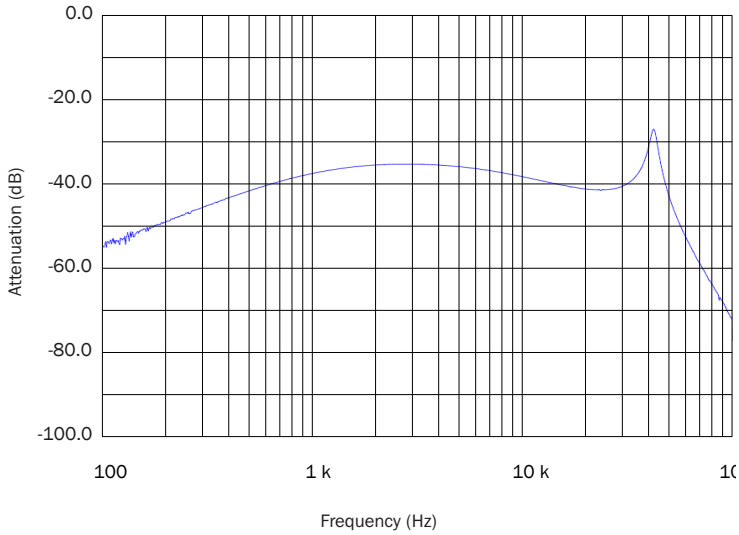
MFK2812D EFFICIENCY

FIGURE 43



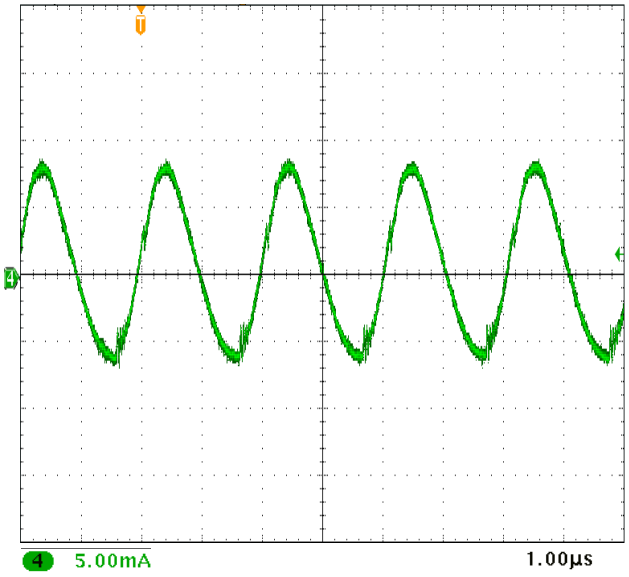
MFK2815D EFFICIENCY

FIGURE 44



MFK DUAL AUDIO REJECTION

FIGURE 45



UNITS ARE PER DIVISION

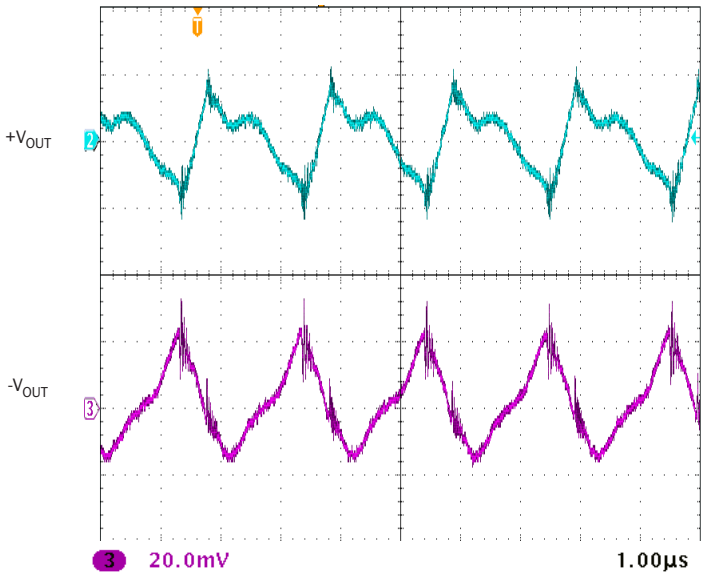
MFK2815D INPUT RIPPLE

FIGURE 46

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

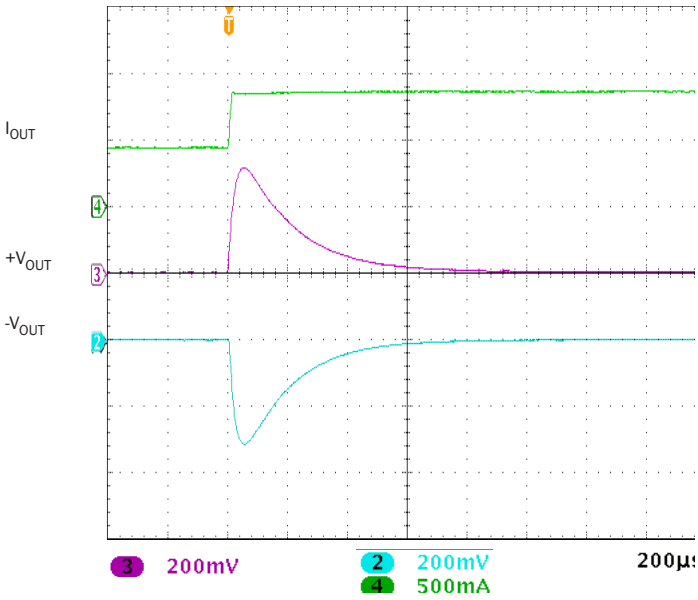
TYPICAL PERFORMANCE PLOTS: 25°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



UNITS ARE PER DIVISION

MFK2815D OUTPUT RIPPLE

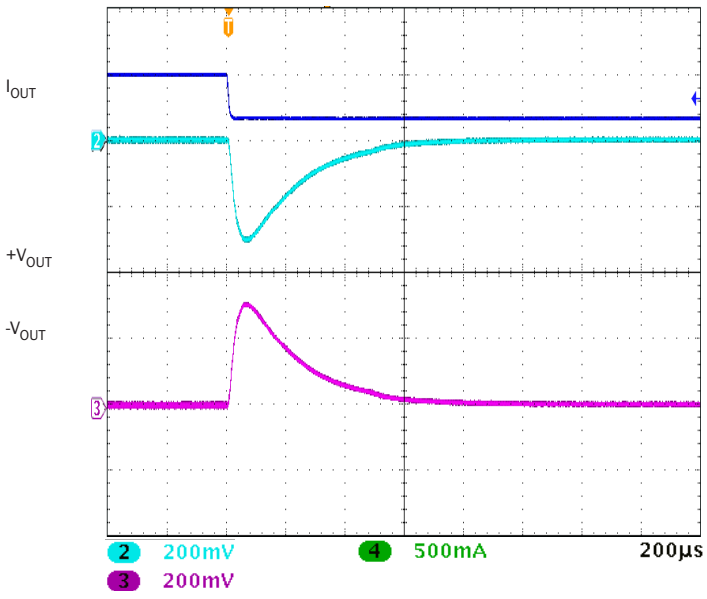
FIGURE 47



UNITS ARE PER DIVISION

MFK2815D STEP LOAD 50% - 100%

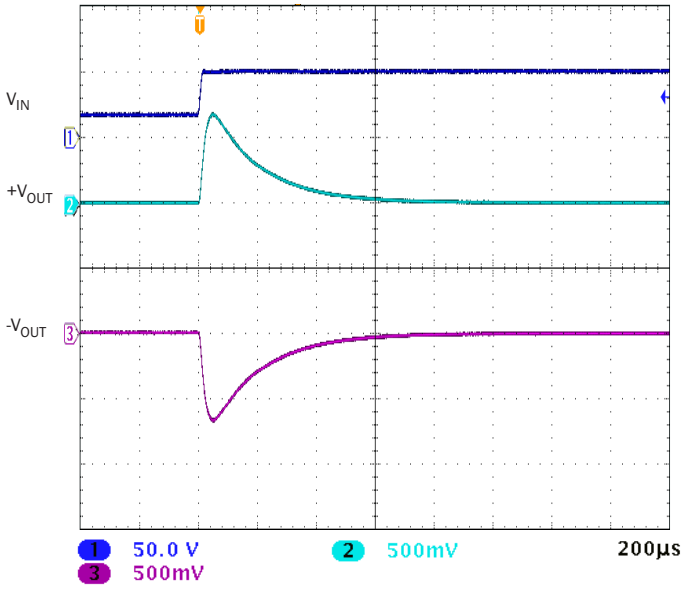
FIGURE 48



UNITS ARE PER DIVISION

MFK2815D STEP LOAD 100% - 50%

FIGURE 49



UNITS ARE PER DIVISION

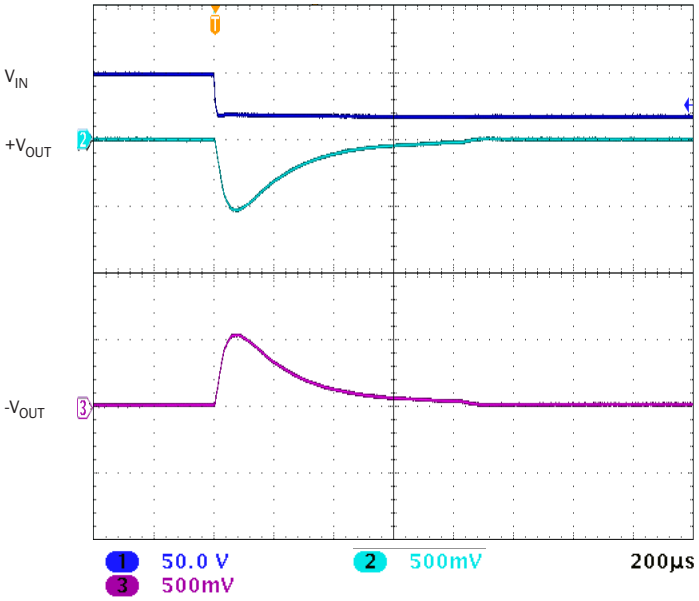
MFK2815D STEP LINE 16 - 50 VOLTS 50% LOAD

FIGURE 50

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

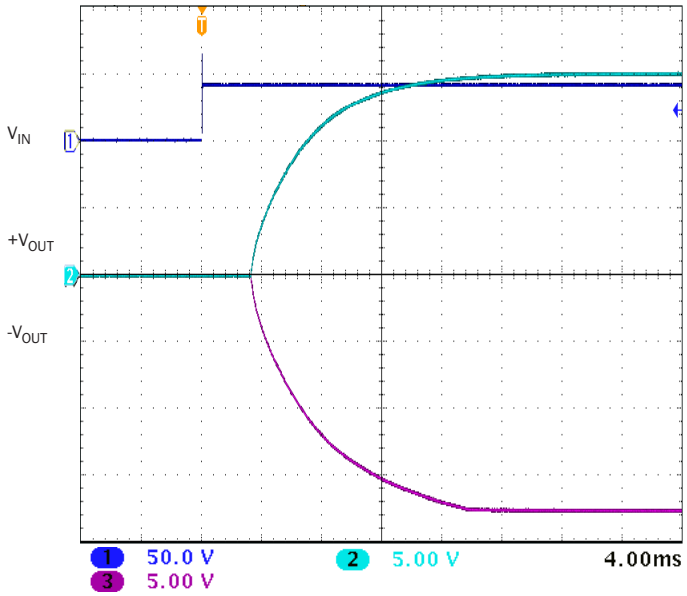
TYPICAL PERFORMANCE PLOTS: 25°C CASE, 42 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.
FOR REFERENCE ONLY, NOT GUARANTEED SPECIFICATIONS.



UNITS ARE PER DIVISION

MFK2815D STEP LINE 50 - 16 VOLTS 50% LOAD

FIGURE 51



UNITS ARE PER DIVISION

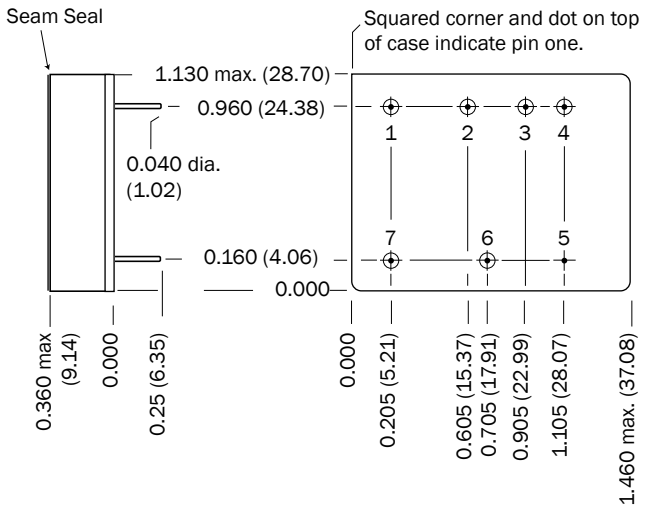
MFK2815D START-UP 100% LOAD

FIGURE 52

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

BOTTOM VIEW MFK SINGLE



Weight: 38 grams maximum

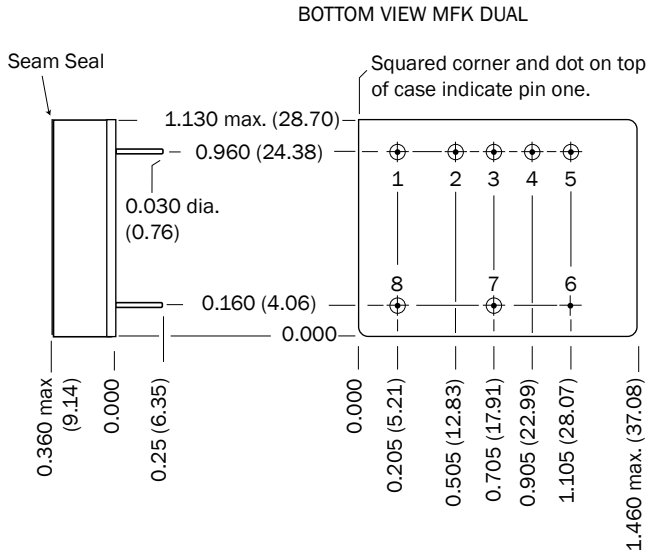
Case dimensions in inches (mm)
Tolerance ±0.005 (0.13) for three decimal places
±0.01 (0.3) for two decimal places
unless otherwise specified

CAUTION
Heat from reflow or wave soldering may damage the device. Solder pins individually with heat application not exceeding 300°C for 10 seconds per pin.

Materials
Header Cold Rolled Steel/Nickel/Gold
Cover Kovar/Nickel
Pins #52 alloy/Gold ceramic seal
Gold plating of 50 - 150 microinches included in pin diameter
Seal Hole: 0.123 ±0.002 (3.12 ±0.05)

Please refer to the numerical dimensions for accuracy.

FIGURE 53: MFK SINGLE OUTPUT
EXCEPT 28 VOLT SINGLE



Weight: 38 grams maximum

Case dimensions in inches (mm)
Tolerance ±0.005 (0.13) for three decimal places
±0.01 (0.3) for two decimal places
unless otherwise specified

CAUTION
Heat from reflow or wave soldering may damage the device. Solder pins individually with heat application not exceeding 300°C for 10 seconds per pin.

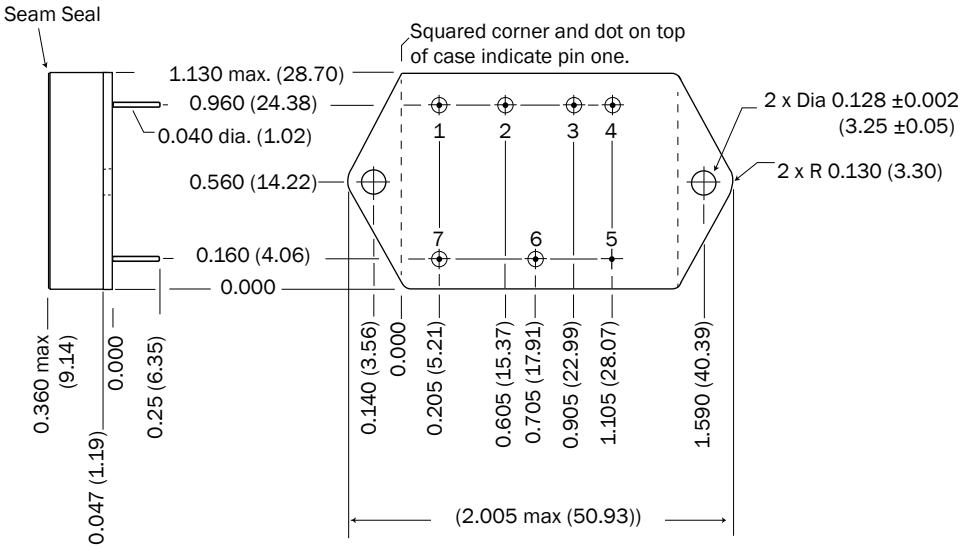
Materials
Header Cold Rolled Steel/Nickel/Gold
Cover Kovar/Nickel
Pins #52 alloy/Gold ceramic seal
Gold plating of 50 - 150 microinches included in pin diameter
Seal Hole: 0.091 ±0.002 (2.31 ±0.05)

Please refer to the numerical dimensions for accuracy.

FIGURE 54: MFK DUAL OUTPUT
INCLUDES 28 VOLT SINGLE

BOTTOM VIEW MFK SINGLE FLANGED

Flanged cases: Designator "F" required in Case Option position of model number



Weight: 38 grams maximum

Case dimensions in inches (mm)
Tolerance ±0.005 (0.13) for three decimal places
±0.01 (0.3) for two decimal places
unless otherwise specified

CAUTION
Heat from reflow or wave soldering may damage the device. Solder pins individually with heat application not exceeding 300°C for 10 seconds per pin.

Materials
Header Cold Rolled Steel/Nickel/Gold
Cover Kovar/Nickel
Pins #52 alloy/Gold compression glass seal
Gold plating of 50 - 150 microinches included in pin diameter
Seal Hole: 0.123 ±0.002 (3.12 ±0.05)

Please refer to the numerical dimensions for accuracy.

FIGURE 55: MFK SINGLE OUTPUT FLANGED

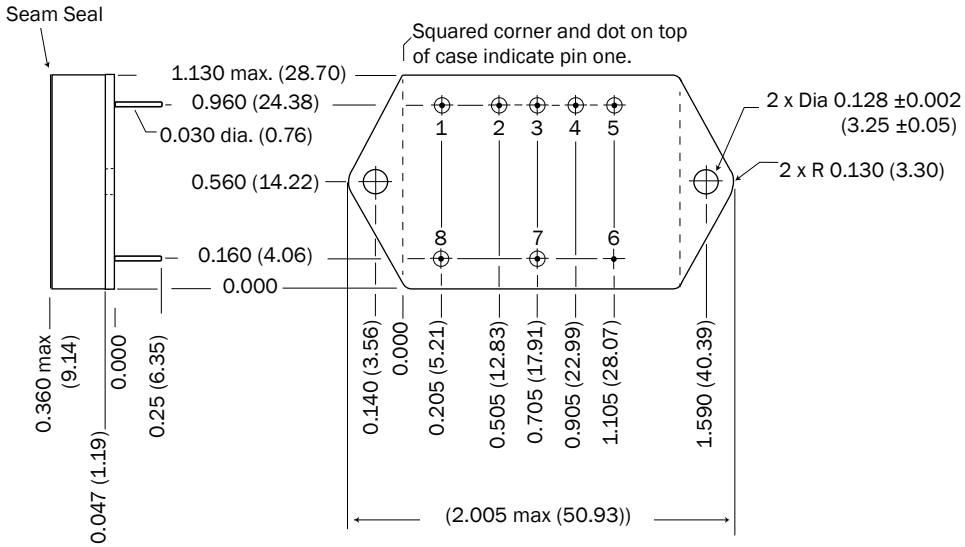
EXCEPT 28 VOLT SINGLE

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

BOTTOM VIEW MFK DUAL FLANGED

Flanged cases: Designator "F" required in Case Option position of model number



Weight: 38 grams maximum

Case dimensions in inches (mm)
Tolerance ±0.005 (0.13) for three decimal places
±0.01 (0.3) for two decimal places
unless otherwise specified

CAUTION
Heat from reflow or wave soldering may damage the device. Solder pins individually with heat application not exceeding 300°C for 10 seconds per pin.

Materials
Header Cold Rolled Steel/Nickel/Gold
Cover Kovar/Nickel
Pins #52 alloy/Gold compression glass seal
Gold plating of 50 - 150 microinches included in pin diameter
Seal Hole: 0.091 ±0.002 (2.31 ±0.05)

Please refer to the numerical dimensions for accuracy.

FIGURE 56: MFK DUAL OUTPUT FLANGED

INCLUDES 28 VOLT SINGLE

MFK Single and Dual DC-DC Converters

16 TO 50 VOLTS INPUT – 10 TO 25 WATT

ELEMENT EVALUATION TABLES FOR QML PRODUCTS ARE IN "APP-009 QUALITY AND CERTIFICATION", APPENDIX A, IN COMPLIANCE WITH MIL-PRF-38534 REVISION L. (LINK HTTPS://WWW.CRANEAE.COM/QUALITY-ASSURANCE-MODULAR-POWER)

ENVIRONMENTAL SCREENING HIGH RELIABILITY STANDARD, /ES, AND /883 (CLASS H)

	NON-QML [1]		CLASS H QML [2, 3]
TEST PERFORMED	**STANDARD**	**/ES**	**/883**
Pre-cap Inspection, Method 2017, 2032	■	■	■
Temperature Cycle (10 times)			
Method 1010, Cond. C, -65°C to +150°C, ambient			■
Method 1010, Cond. B, -55°C to +125°C, ambient		■	
Constant Acceleration			
Method 2001, 3000 g			■
Method 2001, 500 g		■	
PIND, Test Method 2020, Cond. A			■ [4]
Burn-in Method 1015, +125°C case, typical [5]			
96 hours		■	
160 hours			■
Final Electrical Test, MIL-PRF-38534, Group A,			
Subgroups 1 through 6, -55°C, +25°C, +125°C case			■
Subgroups 1 and 4, +25°C case	■	■	
Hermeticity Test, Method 1014			
Gross Leak, Cond. C_1, fluorocarbon		■	■
Fine Leak, Cond. A_2, helium		■	■
Gross Leak, Dip	■		
Final visual inspection, Method 2009	■	■	■

Test methods are referenced to MIL-STD-883 as determined by MIL-PRF-38534.

Notes
1. Non-QML products may not meet all of the requirements of MIL-PRF-38534.
2. All processes are QML qualified and performed by certified operators.
3. A QML products which has an SMD number is marked "QML". A QML product which does not have an SMD number is marked per MIL-PRF-38534 table III.
4. Not required by DLA but performed to assure product quality.
5. Burn-in temperature designed to bring the case temperature to +125°C minimum. Burn-in is a powered test.

TABLE 14: ENVIRONMENTAL SCREENING HIGH RELIABILITY STANDARD, /ES, AND /883 (CLASS H)

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