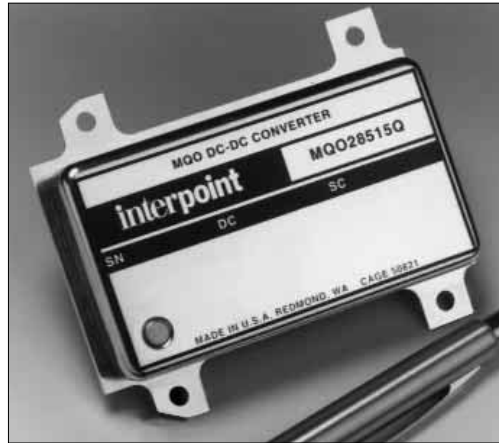


## FEATURES

- $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  operation
- 16 TO 40 VDC input
- Four fully regulated outputs
- Internal EMI filter meets MIL-STD-461C CE03
- Active transient suppressor
- Built in hold-up function with flag
- Fully isolated
- Magnetic feedback
- Fixed frequency, 550 kHz typical
- Topology – Single Ended Forward
- Inhibit function
- Indefinite short circuit protection
- Undervoltage lockout

# DC/DC CONVERTERS 28 VOLT INPUT



Size (max.): 3.200 x 2.600 x 0.460 inches (81.28 x 66.04 x 11.68 mm)  
See Section B8, case N, for dimensions.

Weight: 120 grams typical

Screening: Standard or ES. See Section C2 for screening options,  
see Section A5 for ordering information.

## MQO SERIES 16 WATT

### MODELS VDC OUTPUT

QUAD  
 $\pm 5$  and  $\pm 12$   
 $\pm 5$  and  $\pm 15$

## DESCRIPTION

The MQO Series™ of DC/DC converters supply up to 16.5 watts in a four output configuration of  $\pm 5$  and  $\pm 12$  or  $\pm 5$  and  $\pm 15$  VDC. An integral EMI filter and transient suppressor allow the converters to meet MIL-STD-461C standards without external components. An output hold-up feature provides a low power flag and full output power hold-up through transient dropout conditions.

The MQO Series converters are packaged in hermetically sealed cases and are rated for full power operation from  $-55^{\circ}$  to  $+125^{\circ}\text{C}$  case temperature. This makes these units ideal for military, aerospace, and hi-rel industrial applications.

A high gain bandwidth magnetically isolated control loop is used to precisely regulate the +5 VDC output. Constant frequency pulse width with a single ended forward topology is used. The -5 VDC output and the auxiliary outputs are independently controlled with low headroom regulators, eliminating cross regulation errors. The use of feedforward, compensation, and a high gain bandwidth control loop provides excellent rejection to the conducted audio spectrum of MIL-STD-704A-D and MIL-STD-461C.

### INTEGRAL EMI FILTER

The MQO Series includes a built-in EMI filter and transient suppressor which allow the units to meet the most common military standards without any external components. The internal EMI filter provides both differential and common mode attenuation on the

input power lines to allow meeting the CE03 interference and CS02 susceptibility requirements. The active internal transient suppressor provides protection against MIL-STD-704A, 1275, and 461C line transients. Protection is provided for transients up to 400 V from a 0.5 ohm source and 600 V from a 50 ohm source.

### BUILT-IN HOLD-UP FUNCTION WITH FLAG

An output hold-up feature provides a low power flag and full output power hold-up through transient drop out conditions. At full load for a  $V_{in}$  step from 28 to 0 volts, the minimum hold-up time will be 50  $\mu\text{s}$ . The low power flag (TTL high) is asserted 10  $\mu\text{s}$  before the end of the hold-up time. External capacitance can be added to extend hold-up time.

### SHORT CIRCUIT PROTECTION

MQO Series converters provide predictable current limiters which directly sense output load current in the converter's secondary. During short circuit or overload conditions, the current limiters provide constant output current and an input power fold-back.

### UNDERVOLTAGE LOCKOUT

Undervoltage lockout prevents the converters from operating below approximately 12 VDC input voltage which helps keep system current levels smooth, especially during initialization or re-start operations.

CRANE

interpoint

A CRANE CO. COMPANY

# MQO SERIES 16 WATT

# DC/DC CONVERTERS

ABSOLUTE MAXIMUM RATINGS	
<b>Input Voltage</b>	• 16 to 40 V
<b>Output Power</b>	• 16.75 watts
<b>Lead Soldering Temperature (10 sec per lead)</b>	• 300°C
<b>Storage Temperature Range (Case)</b>	• -65°C to +150°C

INHIBIT	
<b>Inhibit TTL Open Collector</b>	• Logic low (output disabled)
	• Referenced to input common
	• Logic high (output enabled)
	Open collector

TYPICAL CHARACTERISTICS	
<b>Undervoltage Lockout</b>	• 12 V input typical
<b>Isolation</b>	• 100 megohm minimum at 500 V
<b>Audio Rejection</b>	• Up to 50 dB
<b>Conversion Frequency</b>	• 550 kHz typical

RECOMMENDED OPERATING CONDITIONS	
<b>Input Voltage Range</b>	• 16 to 40 VDC continuous
<b>Case Operating Temperature (Tc)</b>	• -55°C to +125°C full power
	• -55°C to +135°C absolute
<b>Derating Output Power/Current</b>	• Linearly from 100% at 125°C to 0% at 135°C

Electrical Characteristics: 25°C Tc, 28 VDC Vin, 100% load, unless otherwise specified.

PARAMETER	CONDITION	MQO28512Q			MQO28515Q			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	+5	4.95	5.00	5.05	4.95	5.00	5.05	VDC
	-5	4.95	5.00	5.05	4.95	5.00	5.05	
	+ AUX.	11.90	12.00	12.10	14.90	15.00	15.10	
	- AUX.	11.90	12.00	12.10	14.90	15.00	15.10	
OUTPUT CURRENT	+5	390	—	2000	390	—	2000	mA
	-5	0	—	350	0	—	350	
	+ AUX.	0	—	208	0	—	167	
	- AUX.	0	—	208	0	—	167	
OUTPUT POWER VIN = 16 TO 40 VDC	+5	1.95	—	10.00	1.95	—	10.00	W
	-5	0	—	1.75	0	—	1.75	
	+ AUX.	0	—	2.50	0	—	2.50	
	- AUX.	0	—	2.50	0	—	2.50	
OUTPUT RIPPLE 10 kHz to 2 MHz	+5	—	50	55	—	50	55	mV p-p
	-5	—	—	30	—	—	30	
	+ AUX.	—	—	50	—	—	50	
	- AUX.	—	—	50	—	—	50	
LINE REGULATION	VIN = 16 TO 36 VDC							
	+5	—	—	20	—	—	20	mV
LOAD REGULATION	MINIMUM LOAD TO FULL							
	±5	—	20	120	—	20	120	mV
INPUT VOLTAGE	MINIMUM LOAD TO FULL							
	Tc = -55° TO +125° C CONTINUOUS	16	28	40	16	28	40	VDC
INPUT CURRENT	TRANSIENT 50 ms 0.5 OHM SOURCE	—	—	400	—	—	400	V
	50 OHM SOURCE	—	—	600	—	—	600	
INPUT RIPPLE	MINIMUM LOAD	—	—	230	—	—	230	mA
	FULL LOAD	—	—	960	—	—	960	
	INHIBITED	—	—	10	—	—	10	
EFFICIENCY	10 kHz TO 2 MHz	—	64	—	—	64	—	%
START-UP	DELAY	—	20	—	—	20	—	ms

# DC/DC CONVERTERS

# MQO SERIES 16 WATT

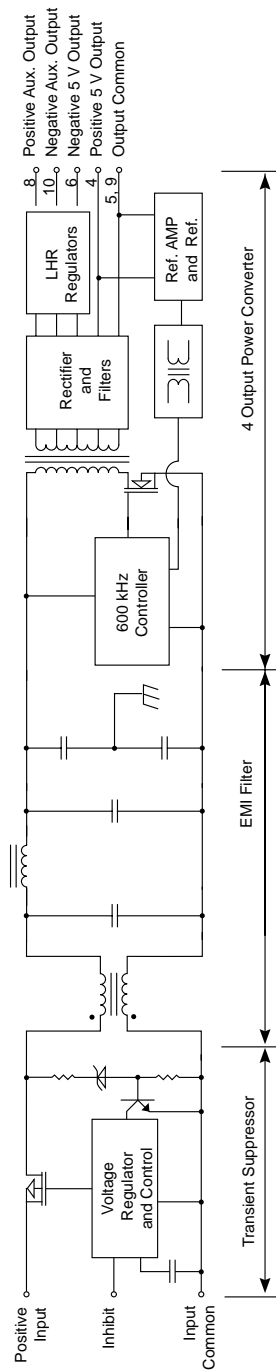
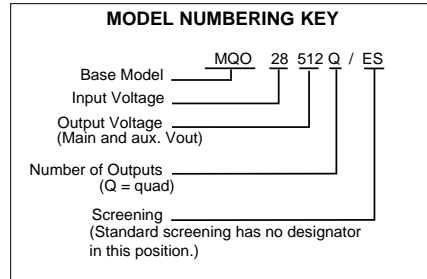
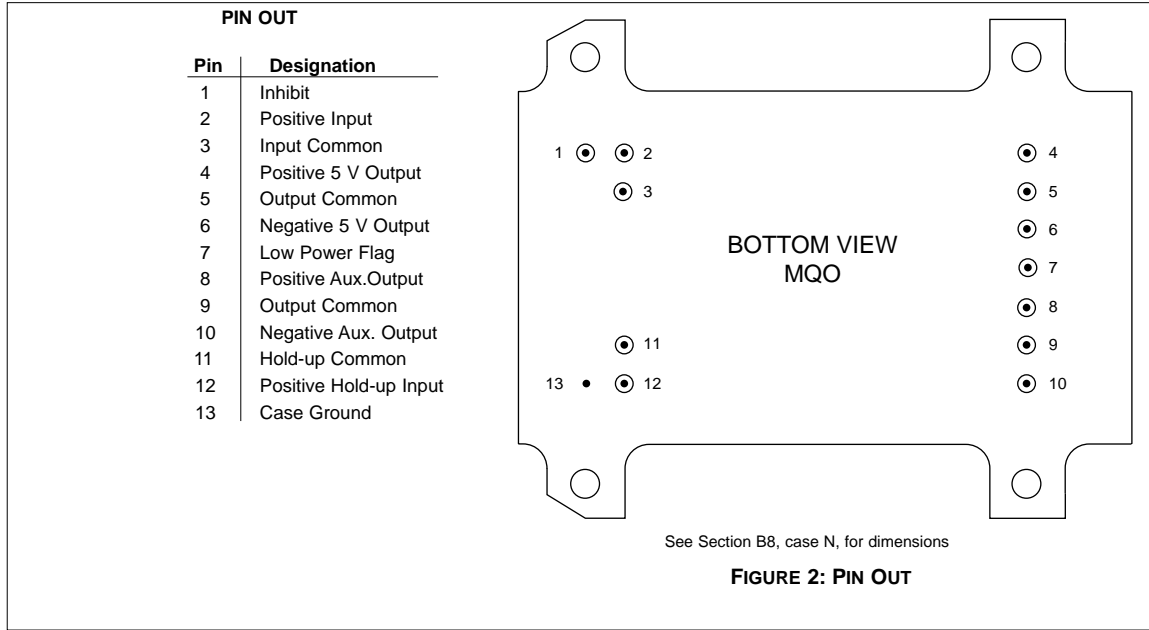


FIGURE 1: MQO BLOCK DIAGRAM

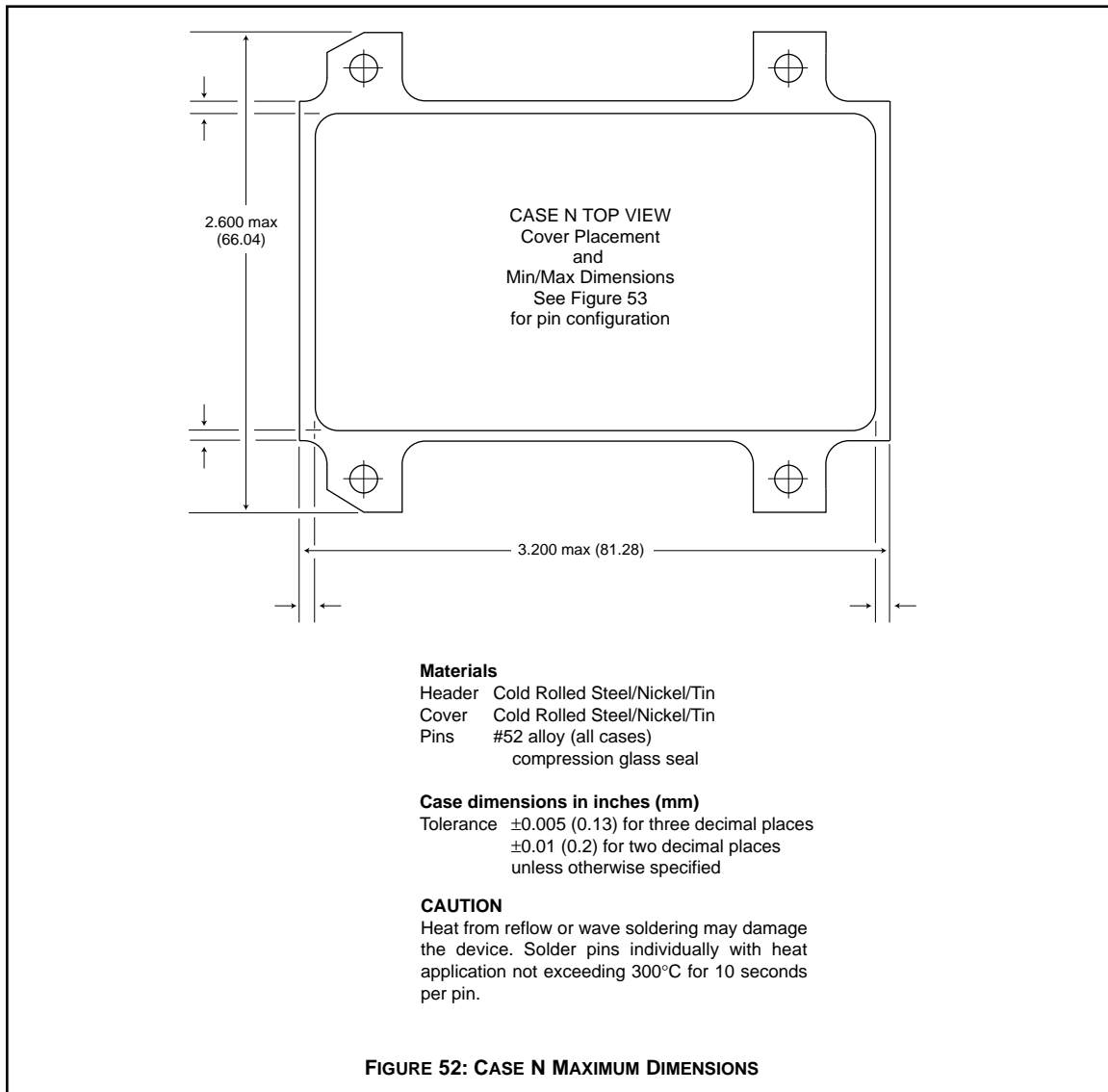
# MQO SERIES 16 WATT

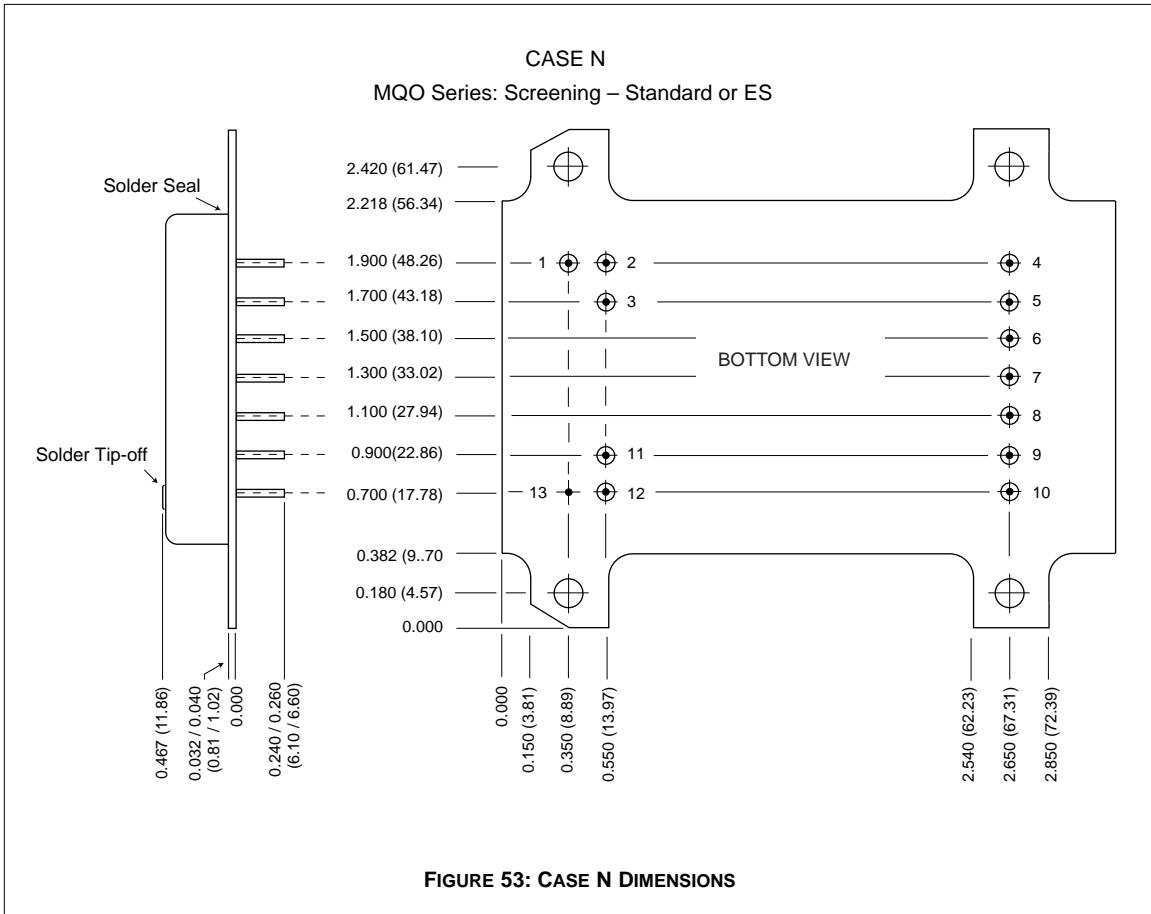
# DC/DC CONVERTERS



# CASE N

# CASES





**QA SCREENING  
125°C PRODUCTS**

**125°C PRODUCTS**

<b>TEST (125°C Products)</b>	<b>STANDARD</b>	<b>/ES</b>	<b>/883 (Class H)*</b>
PRE-CAP INSPECTION Method 2017, 2032	yes	yes	yes
TEMPERATURE CYCLE (10 times) Method 1010, Cond. C, -65°C to 150°C Method 1010, Cond. B, -55°C to 125°C	no no	no yes	yes no
CONSTANT ACCELERATION Method 2001, 3000 g Method 2001, 500 g	no no	no yes	yes no
BURN-IN Method 1015, 160 hours at 125°C 96 hours at 125°C case (typical)	no no	no yes	yes no
FINAL ELECTRICAL TEST MIL-PRF-38534, Group A Subgroups 1 through 6: -55°C, +25°C, +125°C Subgroups 1 and 4: +25°C case	no yes	no yes	yes no
HERMETICITY TESTING Fine Leak, Method 1014, Cond. A Gross Leak, Method 1014, Cond. C Gross Leak, Dip (1 x 10 <sup>-3</sup> )	no no yes	yes yes no	yes yes no
FINAL VISUAL INSPECTION Method 2009	yes	yes	yes

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

\*883 products are built with element evaluated components and are 100% tested and guaranteed over the full military temperature range of -55°C to +125°C.

Applies to the following products

MOR Series	MHD Series	MGH Series	FMGA EMI Filter
MFLHP Series	MHV Series	MCH Series	FMSA EMI Filter
MFL Series	MHF+ Series	FM-704A EMI Filter	HUM Modules**
MHP Series	MHF Series**	FMD**/FME EMI Filter	LCM Modules**
MTR Series	MGA Series	FMC EMI Filter	LIM Modules
MQO Series**	MSA Series	FMH EMI Filter	

\*\*MFLHP Series, MQO Series, MHF Series, FMD EMI Filters, Hum Modules, and LCM Modules do not offer '883' screening.