

# Series 3656

## 32.5 - 80 WATT HERMETIC DC-DC CONVERTERS

### Features

- Built-in EMI input filter meets MIL-STD-461D/E/F requirements CE101, CE102 and CS101
- Specifically designed for MIL-STD-1275 military vehicle applications
- Ruggedized internal construction; vibrate and shock resistant
- Completely self contained hermetically sealed DC-DC Converter
- Rad tolerant design
- SEU Resistant: No optocouplers used
- No external filter caps required
- Fully isolated design with magnetically coupled feedback
- "Inhibit-not" function
- Power on soft start
- 200 kHz operation for low ripple and fast response time
- Short circuit and overvoltage protection
- Capability of external sync for switching frequencies
- Built-in test capability

### Specifications

INPUT: 28 VDC nominal

Range: <16 to 50 VDC continuous  
18 to 50 VDC full power

Survives 100 V surges and 250 V spikes of MIL-STD-1275D

ISOLATION:

Input to case: 500 VDC  
Input to output: 500 VDC  
Output to case: 100 VDC

ENVIRONMENT:

Storage temperature: -55°C to +150°C

Shock: 50 G's MIL-STD-810 Method 516.5 Proc. III

Acceleration: 1000 G's

Vibration: 30 G's MIL-STD-883 Method 2026 Cond. 2H

Grades M:

Full Output Power at  
Tcase = +85°C  
Linearly derates to zero at  
Tcase = +115°C

Grades E:

Full Power Output at  
Tcase = +125°C  
Linearly derates to zero at Tcase = +135°C

WEIGHT: 160 grams typical

SINGLE OUTPUT CONVERTERS		3656-S05 (75W)		
PARAMETER	CONDITION	MIN	TYP	MAX
Output voltage	—	+4.9	+5.0	+5.1
Output current	$V_{in\ min} - V_{in\ max}$	—	—	15A
Efficiency	$P_{out} = \text{max rated load}$	70%	73%	—
Line regulation	$V_{in\ min} - V_{in\ max}$	—	10mV	50mV
Load regulation	$P_{out} = 10\% \text{ to F.L.}$	—	10mV	50mV
Output ripple	F.L. BW 2 MHz $mV_{pp}$	—	40	85

DUAL OUTPUT DEVICES		3656-D15 (75W)		
PARAMETER	CONDITION	MIN	TYP	MAX
Output voltage	+I = -I out out	+14.9	+15.0	+15.1
Output current*	$V_{in\ min} - V_{in\ max}$	±127mA	—	±2.5A
Efficiency	$P_{out} = \text{max rated load}$	78%	82%	—
Line regulation	$V_{in\ min} - V_{in\ max}$	—	±25mV	±125mV
Load regulation†	$P_{out} = 10\% \text{ to F.L.}$	—	±25mV	±125mV
Output ripple	F.L. BW 2 MHz $mV_{pp}$	—	75	180

Notes: \*Up to 90% full power available from either output if rated output power is not exceeded;  
†balanced load conditions.

TRIPLE OUTPUT DEVICES		3656-T15 (47.5W)		
PARAMETER	CONDITION	MIN	TYP	MAX
Output voltage	+I = -I out out	+4.9	+5.0	+5.1
Output current	$V_{in\ min} - V_{in\ max}$	90mA ±32mA	—	5A ±750mA
Efficiency	$P_{out} = \text{max rated load}$	70%	73%	—
Line regulation	$V_{in\ min} - V_{in\ max}$	—	10mV 25mA	50mV 50mA
Load regulation	$P_{out} = 10\% \text{ to F.L.}$	—	10mV 25mA	50mV 50mV
Output ripple	F.L. BW 2 MHz $mV_{pp}$	—	40	85
		—	—	50

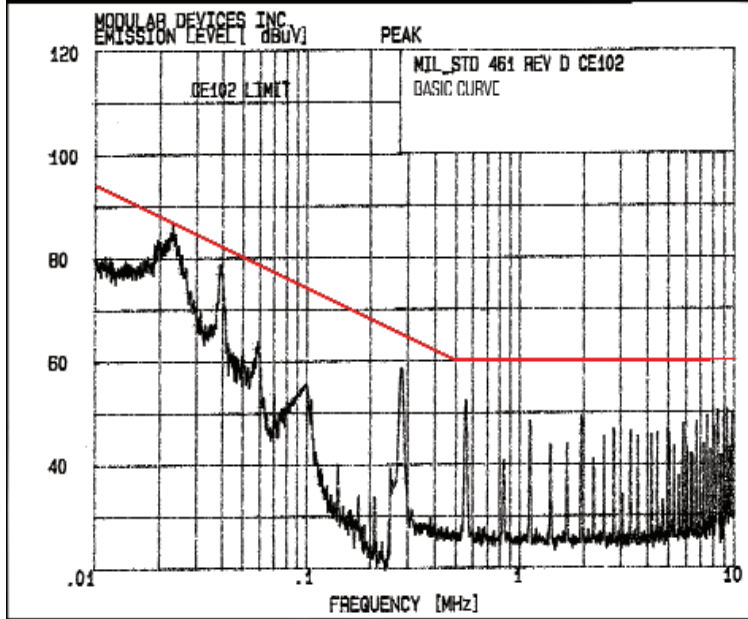
Model No.	Case Style	Pin Count	Mounting
3656	—	4	Solder Sealed PCB Mount with Flange
3656	LF	7	Seam Weld PCB Mount with Flange
3656	ZF	9	Seam Weld Chassis Mount with Flange
3656	PD	11	Solder Sealed Flangeless PCB Stud Mount

3656-SXX output <24 VDC			3656-SXX output 24 VDC			3656-DXX			3656-TXX		
Pin 1	bit	Pin 7 N/C	Pin 1	bit	Pin 7 adjust	Pin 1	bit	Pin 7 adjust	Pin 1	bit	Pin 7 N/C
Pin 2	Inhibit not	Pin 8 main output	Pin 2	Inhibit not	Pin 8 + remote sense	Pin 2	Inhibit not	Pin 8 + remote sense	Pin 2	Inhibit not	Pin 8 main output
Pin 3	soft start	Pin 9 main output ret	Pin 3	soft start	Pin 9 - remote sense	Pin 3	soft start	Pin 9 - remote sense	Pin 3	soft start	Pin 9 main output ret
Pin 4	sync	Pin 10 + remote sense	Pin 4	sync	Pin 10 main output	Pin 4	sync	Pin 10 + dual output	Pin 4	sync	Pin 10 + dual output
Pin 5	+ input	Pin 11 adjust	Pin 5	+ input	Pin 11 N/C	Pin 5	+ input	Pin 11 dual output rtn	Pin 5	+ input	Pin 11 dual output rtn
Pin 6	input ret	Pin 12 - remote sense	Pin 6	input ret	Pin 12 main output ret	Pin 6	input ret	Pin 12 - dual output	Pin 6	input ret	Pin 12 - dual output

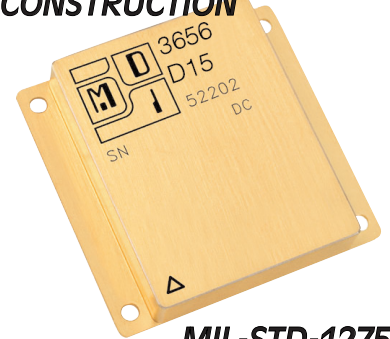


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Meets MIL-STD-461 D/E/F Conducted Emissions, Power Leads CE101, CE102

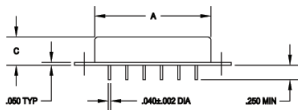


**RUGGED CONSTRUCTION**

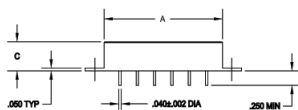


**MIL-STD-1275D  
28 VOLTS DC INPUT**

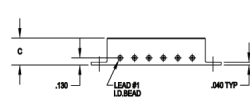
Case Style 4



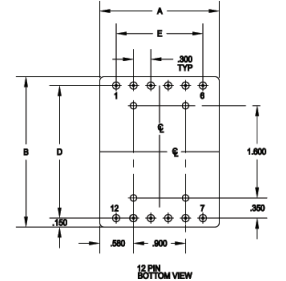
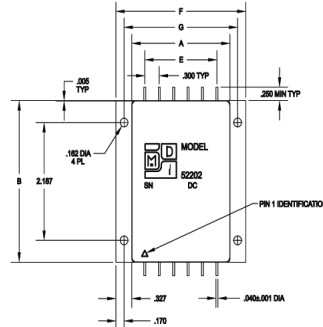
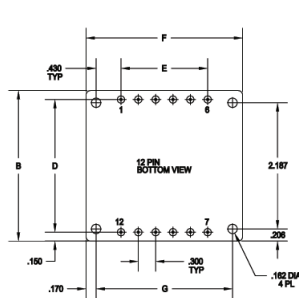
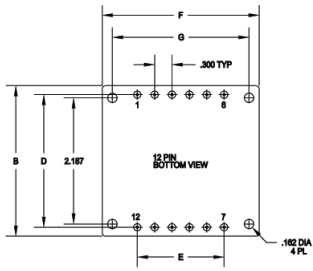
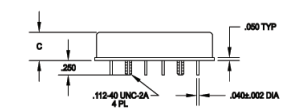
Case Style 7



Case Style 9



Case Style 11



## Case Dimensions

Units: inches | millimeters

TOLERANCES: All dimensions  $\pm 0.01$  except F = max, C = +0.01/-0.020 For Custom Packages, Contact Factory  
DRAWINGS IN INCHES.

Case Style		A	B	C	D	E	F	G
4	—	2.040   51.816	2.610   66.294	0.495   12.573	2.300   58.420	1.500   38.100	2.710   68.834	2.360   59.944
7	LF	2.040   51.816	2.610   66.294	0.495   12.573	2.300   58.420	1.500   38.100	2.710   68.834	2.360   59.944
9	ZF	2.040   51.816	3.010   76.454	0.495   12.573	—   —	1.500   38.100	2.710   68.834	2.360   59.944
11	PD	2.040   51.816	2.610   66.294	0.495   12.573	2.300   58.420	1.500   38.100	—   —	—   —

## GRADE LEVELS:

Please specify grade level for your application. Industrial grade units will be shipped if no option is specified.

- I -40°C to +85°C industrial
- M -55°C to +85°C military
- E -55°C to +125°C military