

# 12.5-30 Watt Hybrid

## Features

- Completely self contained Thick Film Hybrid DC-DC Converter
- Built-in EMI input filter meets MIL-STD-461C requirements CE01, CE03, CS01, CS02 and CS06
- "Inhibit-not" function
- Power on soft start
- Fully isolated, input to output
- Single, double and triple outputs
- Short circuit protection
- 200 kHz operation for low ripple and fast response
- No external filter caps required
- Hermetically sealed package

## Specifications

**INPUT:** 16 to 24 VDC nominal

Range: 8 to 40 VDC continuous

Unit will start up at  $V_{in} > 9.5$  VDC

**OUTPUT:** for  $V_{in} < 16$  VDC, the output power linearly derates to 1/2 full output power at  $V_{in} = 8$  VDC

### 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

Acceleration: 500 G's

Vibration: 30 G's

Grade M:

Full Power Output at  $T_{case} = +85^{\circ}\text{C}$

Linearly derates to zero at  $T_{case} = +115^{\circ}\text{C}$

Grade E:

Full Power Output at  $T_{case} = +125^{\circ}\text{C}$

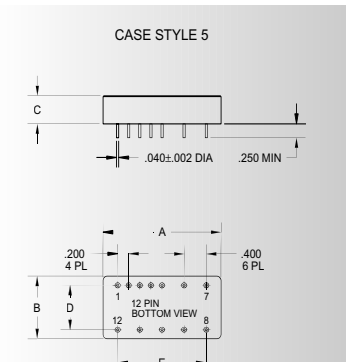
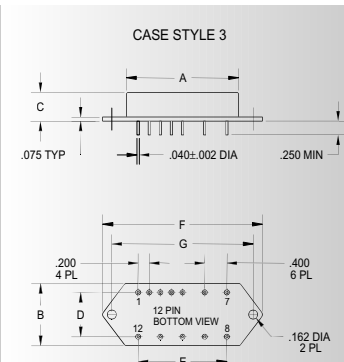
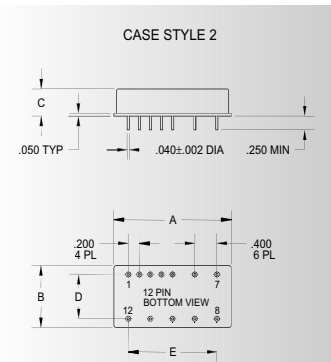
Linearly derates to zero at  $T_{case} = +135^{\circ}\text{C}$

**WEIGHT:** 75 grams typical

SINGLE OUTPUT DEVICES		3378-S03.3 (20W)			3378-S05 (30W)			3378-S05.2 (30W)			3378-S12 (30W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1	+5.1	+5.2	+5.3	+11.9	+12.0	+12.1
Output current	$V_{in} = 16$ to 40 VDC	—	—	6.06A	—	—	6A	—	—	5.76A	—	—	2.5A
Efficiency	$P_{out} = \text{max rated load}$	66%	69%	—	71%	74%	—	71%	74%	—	78%	82%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in} = 16$ to 40 VDC	—	10mV	30mV	—	10mV	50mV	—	10mV	50mV	—	20mV	100mV
Load regulation	$P_{out} = 10\%$ to F.L.	—	10mV	30mV	—	10mV	50mV	—	10mV	50mV	—	20mV	100mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	30	65	—	40	85	—	40	85	—	60	150

SINGLE OUTPUT DEVICES		3378-S15 (30W)			3378-S28 (30W)				
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX		
Output voltage	—	+14.9	+15.0	+15.1	+27.8	+28.0	+28.2		
Output current	$V_{in} = 16$ to 40 VDC	—	—	2A	—	—	1.07A		
Efficiency	$P_{out} = \text{max rated load}$	79%	83%	—	78%	82%	—		
Line regulation	$P_{out} = \text{max rated load}$ $V_{in} = 16$ to 40 VDC	—	25mV	125mV	—	50mV	250mV		
Load regulation	$P_{out} = 10\%$ to F.L.	—	25mV	125mV	—	50mV	250mV		
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	75	180	—	150	350		

Model No.	Case Style	Pin Count	Mounting
3378	2	12	Solder Sealed Flangeless PCB Mount
3378	F	12	Solder Sealed PCB Mount with Flange
3378	I	12	Seam Weld Flangeless PCB Mount
3378	IF	12	Seam Weld PCB Mount with Flange
3378	WF	8	Seam Weld Chassis Mount with Flange
3378	PB	10	Solder Sealed Flangeless PCB Stud Mount
3378	PE	12	Seam Weld Flangeless PCB Stud Mount



**TOLERANCES:** ALL DIMENSIONS ±0.01 EXCEPT F = MAX, C = +0.01/-0.02; DRAWINGS IN INCHES.

## Case Dimensions

Units: inches | millimeters

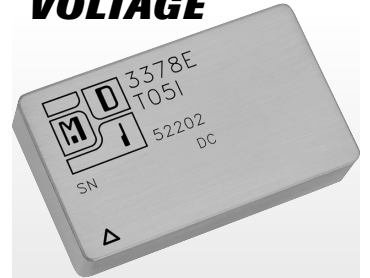
Case Style	A	B	C	D	E	F	G
2	2.200   55.880	1.350   34.290	0.495   12.573	1.000   25.400	1.600   40.640	—   —	—   —
3 F	2.200   55.880	1.350   34.290	0.495   12.573	1.000   25.400	1.600   40.640	2.960   75.184	2.610   66.294
5 I	2.225   56.515	1.350   34.290	0.495   12.573	1.000   25.400	1.600   40.640	—   —	—   —
6 IF	2.225   56.515	1.350   34.290	0.495   12.573	1.000   25.400	1.600   40.640	2.960   75.184	2.610   66.294
8 WF	2.225   56.515	1.710   43.434	0.495   12.573	—   —	1.600   40.640	2.960   75.184	2.610   66.294
10 PB	2.225   56.515	1.350   34.290	0.495   12.573	1.000   25.400	1.600   40.640	—   —	—   —
12 PE	2.225   56.515	1.350   34.290	0.495   12.573	1.000   25.400	1.600   40.640	—   —	—   —

# DC-DC CONVERTERS

## FULL FEATURE SERIES

# 3378

### LOW INPUT VOLTAGE

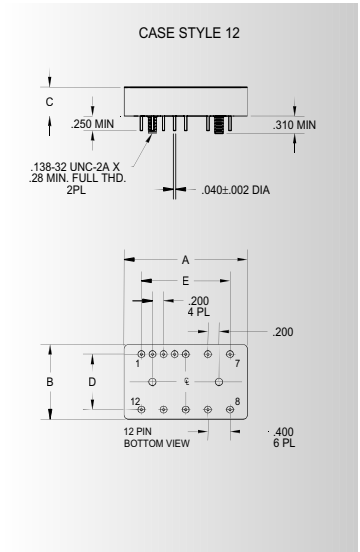
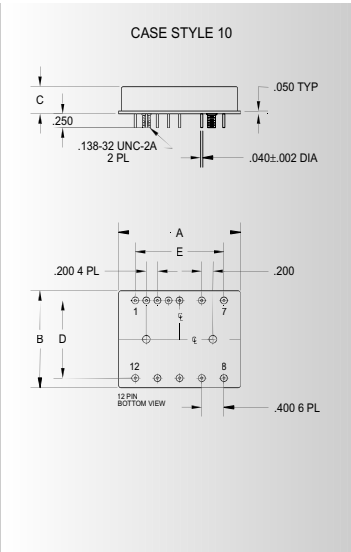
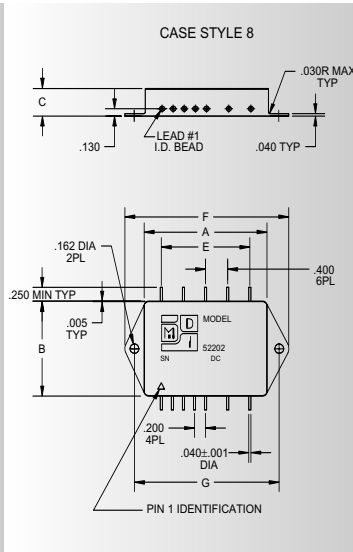
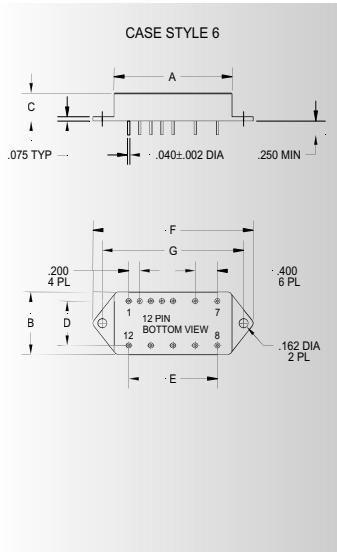


### 8-40 VDC

DUAL OUTPUT DEVICES		3378-D05 (30W)			3378-D12 (30W)			3378-D15 (30W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	$+I_{out} = -I_{out}$	+4.9	+5.0	+5.1	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1
		-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1
Output current*	$V_{in} = 16$ to 40 VDC	$\pm 150$ mA	—	$\pm 3$ A	$\pm 95$ mA	—	$\pm 1.25$ A	$\pm 76$ mA	—	$\pm 1$ A
Efficiency	$P_{out} = \text{max rated load}$	72%	76%	—	78%	82%	—	79%	83%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in} = 16$ to 40 VDC	—	$\pm 10$ mV	$\pm 50$ mV	—	$\pm 20$ mV	$\pm 100$ mV	—	$\pm 25$ mV	$\pm 125$ mV
		—	$\pm 10$ mV	$\pm 50$ mV	—	$\pm 20$ mV	$\pm 100$ mV	—	$\pm 25$ mV	$\pm 125$ mV
Load regulation†	$P_{out} = 10\%$ to F.L.	—	$\pm 10$ mV	$\pm 50$ mV	—	$\pm 20$ mV	$\pm 100$ mV	—	$\pm 25$ mV	$\pm 125$ mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	40	85	—	60	150	—	75	180
		—	40	85	—	60	150	—	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		3378-T3.3/5 (12.5W)			3378-T3.3/12 (17.5W)			3378-T3.3/15 (17.5W)			3378-T05 (12.5W)			3378-T12 (17.5W)			3378-T15 (17.5W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	$+I_{out} = -I_{out}$	+3.2	+3.3	+3.4	+3.2	+3.3	+3.4	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1	+4.9	+5.0	+5.1	+4.9	+5.0	+5.1
		-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1	-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1
Output current	$V_{in} = 16$ to 40 VDC	300mA	—	3A	300mA	—	3A	300mA	—	3A	200mA	—	2A	200mA	—	2A	200mA	—	2A
		$\pm 40$ mA	—	$\pm 250$ mA	$\pm 40$ mA	—	$\pm 312$ mA	$\pm 32$ mA	—	$\pm 250$ mA	$\pm 40$ mA	—	$\pm 250$ mA	$\pm 40$ mA	—	$\pm 312$ mA	$\pm 32$ mA	—	$\pm 250$ mA
Efficiency	$P_{out} = \text{max rated load}$	65%	68%	—	65%	68%	—	65%	68%	—	66%	69%	—	71%	74%	—	71%	74%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in} = 16$ to 40 VDC	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV
		—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV
Load regulation	$P_{out} = 10\%$ to F.L.	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV
		—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	30	65	—	30	65	—	30	65	—	40	85	—	40	85	—	40	85
		—	30	65	—	30	65	—	30	65	—	40	85	—	40	85	—	40	85



3378-SXX output <24 VDC			3378-SXX output ≥24 VDC			3378-DXX			3378-TXX		
Pin 1	bit	Pin 7 + input	Pin 1	bit	Pin 7 + input	Pin 1	bit	Pin 7 + input	Pin 1	bit	Pin 7 + input
Pin 2	inhibit not	Pin 8 main output	Pin 2	inhibit not	Pin 8 N/C	Pin 2	inhibit not	Pin 8 N/C	Pin 2	inhibit not	Pin 8 main output
Pin 3	soft start	Pin 9 main output ret	Pin 3	soft start	Pin 9 N/C	Pin 3	soft start	Pin 9 N/C	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	N/C	Pin 11 adjust	Pin 5	N/C	Pin 11 N/C	Pin 5	N/C	Pin 11 dual output ret	Pin 5	N/C	Pin 11 dual output ret
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

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

- M** +85°C military
- E** +125°C military