

# 12.5-30 Watt Hybrid

## Features

- Rad Hard: TID > 25kRad(Si)
- No SEE: LET > 37MeV\*cm<sup>2</sup>/mg
- Specifically designed for redundant or individual space applications
- Completely self contained Thick Film Hybrid DC-DC Converter
- No external filter caps required
- Fully isolated design
- "Inhibit-not" function
- Power on soft start
- 200 kHz operation for low ripple and fast response time
- Built-in EMI input filter meets MIL-STD-461C requirements CE01, CE03, CS01, CS02 and CS06
- Short circuit and overvoltage protection
- Capability of external sync for switching frequencies
- Built-in test capability

## Specifications

**INPUT:** 120 VDC nominal  
Range: 86 to 158 VDC continuous

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

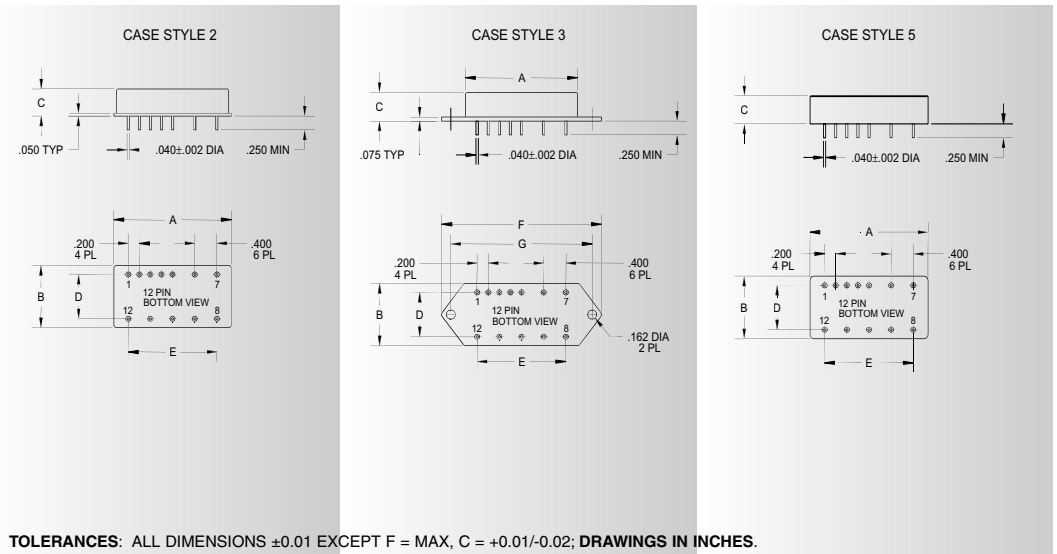
**ENVIRONMENT:**  
Storage temperature: -55°C to +150°C  
Shock: 50 G's  
Acceleration: 500 G's  
Vibration: 30 G's

Grades EU, R & S:  
Full Power Output at T<sub>case</sub> = +85°C  
Linearly derates to zero at T<sub>case</sub> = +115°C  
Grades RE & SE:  
Full Power Output at T<sub>case</sub> = +125°C  
Linearly derates to zero at T<sub>case</sub> = +135°C  
**WEIGHT:** 75 grams typical

SINGLE OUTPUT DEVICES		3060-S02 (12W)			3060-S02.5 (15W)			3060-S03.3 (20W)			3060-S05 (30W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+1.9	+2.0	+2.1	+2.4	+2.5	+2.6	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1
Output current	V <sub>in min</sub> — V <sub>in max</sub>	—	—	6.06A	—	—	6.06A	—	—	6.06A	—	—	6A
Efficiency	P <sub>out</sub> = max rated load	57%	60%	—	62%	65%	—	67%	70%	—	72%	75%	—
Line regulation	P <sub>out</sub> = max rated load V <sub>in min</sub> — V <sub>in max</sub>	—	10mV	30mV	—	10mV	30mV	—	10mV	30mV	—	10mV	50mV
Load regulation	P <sub>out</sub> = 10% to F.L.	—	10mV	30mV	—	10mV	30mV	—	10mV	30mV	—	10mV	50mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	25	50	—	30	60	—	30	65	—	40	85

SINGLE OUTPUT DEVICES		3060-S05.2 (30W)			3060-S12 (30W)			3060-S15 (30W)			3060-S28 (30W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+5.1	+5.2	+5.3	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1	+27.8	+28.0	+28.2
Output current	V <sub>in min</sub> — V <sub>in max</sub>	—	—	5.76A	—	—	2.5A	—	—	2A	—	—	1.07A
Efficiency	P <sub>out</sub> = max rated load	72%	75%	—	79%	83%	—	80%	84%	—	79%	83%	—
Line regulation	P <sub>out</sub> = max rated load V <sub>in min</sub> — V <sub>in max</sub>	—	10mV	50mV	—	20mV	100mV	—	25mV	125mV	—	50mV	250mV
Load regulation	P <sub>out</sub> = 10% to F.L.	—	10mV	50mV	—	20mV	100mV	—	25mV	125mV	—	50mV	250mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	40	85	—	60	150	—	75	180	—	150	350

Model No.	Case Style	Pin Count	Mounting
3060	2	12	Solder Sealed Flangeless PCB Mount
3060	F	12	Solder Sealed PCB Mount with Flange
3060	I	12	Seam Weld Flangeless PCB Mount
3060	IF	12	Seam Weld PCB Mount with Flange
3060	WF	8	Seam Weld Chassis Mount with Flange
3060	PB	10	Solder Sealed Flangeless PCB Stud Mount
3060	PE	12	Seam Weld Flangeless PCB Stud Mount



## 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	—   —	—   —

# RAD HARD DC-DC CONVERTERS

## FULL FEATURE SERIES

# 3060

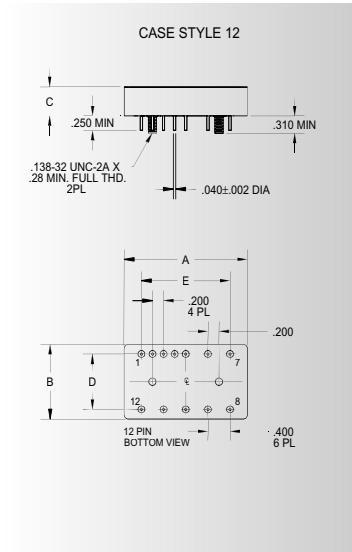
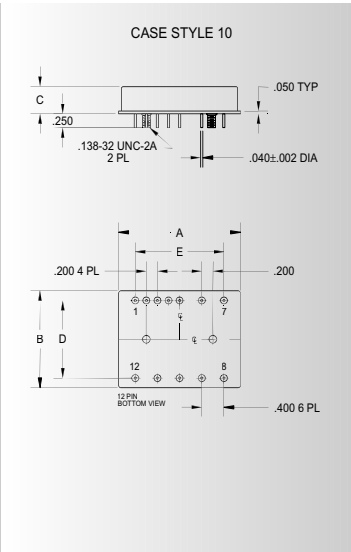
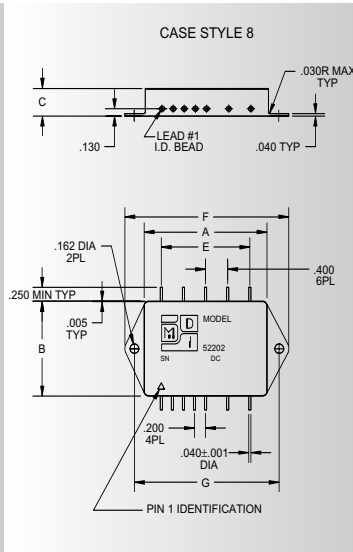
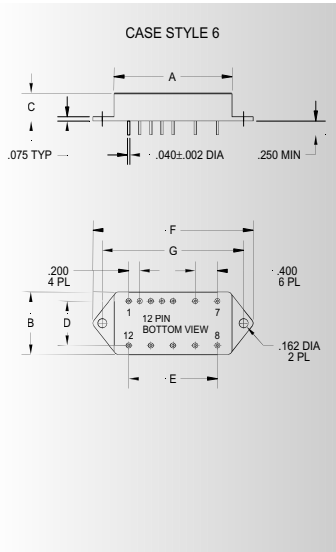
DUAL OUTPUT DEVICES		3060-D3.3/5 (14.9W)			3060-D05 (30W)			3060-D12 (30W)			3060-D15 (30W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	$+I_{out} = -I_{out}$	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1
		+4.9	+5.0	+5.1	-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1
Output current*	$V_{in\ min} - V_{in\ max}$	300mA	—	3A	±150mA	—	±3A	±95mA	—	±1.25A	±76mA	—	±1A
		100mA	—	1A	—	—	—	—	—	—	—	—	—
Efficiency	$P_{out} = \text{max rated load}$	63%	66%	—	73%	77%	—	79%	83%	—	80%	84%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	10mV	30mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
		—	10mV	50mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
Load regulation†	$P_{out} = 10\% \text{ to F.L.}$	—	10mV	30mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
		—	10mV	50mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	30	65	—	40	85	—	60	150	—	75	180
		—	25	50	—	—	—	—	—	—	—	—	—



## 120 VDC

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

TRIPLE OUTPUT DEVICES		3060-T3.3/5 (12.5W)			3060-T3.3/12 (17.5W)			3060-T3.3/15 (17.5W)			3060-T05 (12.5W)			3060-T12 (17.5W)			3060-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	$V_{in\ min} - V_{in\ max}$	300mA	—	3A	300mA	—	3A	300mA	—	3A	90mA	—	2A	90mA	—	2A	90mA	—	2A
		±40mA	—	±250mA	±40mA	—	±312mA	±32mA	—	±250mA	±40mA	—	±250mA	±40mA	—	±312mA	±32mA	—	±250mA
Efficiency	$P_{out} = \text{max rated load}$	67%	70%	—	67%	70%	—	67%	70%	—	67%	70%	—	72%	75%	—	72%	75%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	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	$P_{out} = 10\% \text{ to F.L.}$	—	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
		—	—	50	—	—	50	—	—	50	—	—	50	—	—	50	—	—	50



### 3060-SXX output <24 VDC

Pin 1	bit	Pin 7	+ input
Pin 2	inhibit not	Pin 8	main output
Pin 3	soft start	Pin 9	main output ret
Pin 4	sync	Pin 10	+ remote sense
Pin 5	N/C	Pin 11	adjust
Pin 6	input ret	Pin 12	- remote sense

### 3060-SXX output ≥24 VDC

Pin 1	bit	Pin 7	+ input
Pin 2	inhibit not	Pin 8	N/C
Pin 3	soft start	Pin 9	N/C
Pin 4	sync	Pin 10	main output
Pin 5	N/C	Pin 11	N/C
Pin 6	input ret	Pin 12	main output ret

### 3060-DXX

Pin 1	bit	Pin 7	+ input
Pin 2	inhibit not	Pin 8	N/C
Pin 3	soft start	Pin 9	N/C
Pin 4	sync	Pin 10	+ dual output
Pin 5	N/C	Pin 11	dual output ret
Pin 6	input ret	Pin 12	- dual output

### 3060-TXX

Pin 1	bit	Pin 7	+ input
Pin 2	inhibit not	Pin 8	main output
Pin 3	soft start	Pin 9	main output ret
Pin 4	sync	Pin 10	+ dual output
Pin 5	N/C	Pin 11	dual output ret
Pin 6	input ret	Pin 12	- dual output

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

**EU** Engineering Units

**R** 25 KRAD, +85°C military/aerospace  
**RE** 25 KRAD, +125°C military/aerospace

**S** 25 KRAD, +85°C space  
**SE** 25 KRAD, +125°C space