## **SMD SERIES**

2 WATT Regulated Dual Output SMD 12 PIN Package

Wide 4:1 Input Range 3000 Vdc Isolation Remote on/off control Short Circuit Protection: Indefinite (Automatic Recovery) Temperature Range (°C): -40 ~ +75 (For 100% Load) Reel Contains

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified.

CE

DC/DC Converter

Input Voltage		
Input Voltage Range	Vdc	see product
Start up Time (Nominal Vin and constant resistive load)	mS, typ	30
Input Current No load	mA, max.	see product
Input Current Full Load (typ.)	mA, typ.	see product
Input Filter		Capacitor
Input Reflected Ripple Current	mA, pk-pk	20
Under Voltage lockout	Vdc	12V Models - Module ON/OFF: 4.1 / 3.5Vdc typ. 24V Models - Module ON/OFF: 8.5 / 7.0Vdc typ.

Output Voltage		
Output Voltage Accuracy	%	±1.0
Output Voltage Dual	Vdc	see product
Output Current Min. Load Dual	mA, min.	see product
Output Current Full Load Dual	mA, max.	see product
Line Regulation	%, max.	±0.2
Load Regulation (from 0% to 100% Load)	%, max.	±0.5
Cross Regulation (Dual Output)	%, max.	±5.0
Ripple and Noise (20 MHz Bandwith)	mVpp, max.	100
Short Circuit Protection		Indefinite (Automatic Recovery)
Temperature Coefficient	% / °C	±0.02
Capacitive Load	μF, max.	see product
Transient Recovery Time	μs, typ.	500
Transient Response Deviation	%, max.	±3

#### **REMARKS:**

"Input Reflected Ripple Current": Measured with a simulated source inductance of 12 $\mu$ H and a source capacitor Cin (47 $\mu$ F, ESR<1.0 $\Omega$  at 100KHz).

#### **REMARKS:**

"Cross Regulation": One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.

"Ripple & Noise": Measured with a 10µF electrolytic capacitor and 0.1µF ceramic capacitor.

"Capacitive Load": Tested with minimal Vin and constant resistive load.

"Transient Recovery Time" and " Transient Response Deviation": Tested by normal Vin and 100%-25%, 25% load step change.

The information & specifications contained in this data sheet are believed to be corrected at time of publication. PEAK electronics accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subjected to change without notice. No rights under any patent accompany the sale of any such products or information contained herein.



Mainzer Str. 151-153 D-55299 Nackenheim +49(0)6135 70260 www.peak-electronics.de



Mainzer Str. 151-153 D-55299 Nackenheim

+49(0)6135 70260

www.peak-electronics.de

# SMD SERIES

DC/DC Converter



PEAK

MTBF Reliability Calculated (MIL-HDBK-217F) at 25°C   Mhrs   >0.89     Remote on/off control   ON: Open or high impedance OFF: 2-4mA input current(via 1k), OFF stand by input current(nominal Vin)3.0mA,max.     Safety Standard (designed to meet)   UL/cUL 60950-1, 62368-1 IEC/EN 60950-1, 62368-1     Operating Temperature   °C   -40 ~ +75 (For 100% Load)     Storage Temperature   °C   -55 ~ +125	General Specification		
I/O Isolation Capacitance     pF     25       I/O Isolation Resistance     Ohm, min.     1G       Switching Frequency     kHz, min     100       Humidity     %, rel H     95       MTBF Reliability Calculated (MIL-HDBK-217F) at 25°C     Mhrs     >0.89       Remote onioff control     ON: Open on tigh impedance OFF: 24-mA input current(via 1k), OFF stand by input current(nominal Vin)3.0mA,max.       Safety Standard (designed to meet)     UL/CIL 60950-1, 62368-1       Operating Temperature     °C     40 ~75 (For 100% Load)       Storage Temperature     °C     40 ~125       Cooling     Natural Convection     Natural Convection       Lead-free reflow solder process     °C (10 sec.max)     245       Moisture Sensitivity Level     Kersto 40     9 0.5 mm C5191R-H Solder-coated       Vibration <td>Efficiency @FL</td> <td>%</td> <td>see product</td>	Efficiency @FL	%	see product
I/O Isolation Resistance Ohm, min. IG   Switching Frequency kHz, min 100   Humidity %, nel H 95   MTBF Reliability Calculated (MIL-HDBK-217F) at 25°C Mhrs >0.809   Remote on/off control ON: Open or high impedance OFF: 24-mA input current(via 1k), OFF stand by input current(nominal Vin)3.0mA.max.   Safey Standard (designed to meet) UL/LUL 60950-1, 62368-1   Operating Temperature °C 40 ~ +76 (ro 100% Load)   Storage Temperature °C 40 ~ +76 (ro 100% Load)   Storage Temperature °C 40 ~ +76 (ro 100% Load)   Storage Temperature °C (10 sec.max) PIC/JEDEC J-STD-020D.1   Reflow temperature peak °C (10 sec.max) 245   Moisture Sensitivity Level Level 1   Vitration Non-conductive Black plastic (UL94V-0 rated)   Pin Material 9 0.5 mm C5191R-H Solder-coated   Weight g 2.0   Dimension mm 14.65 x 14.40 x 8.95   Dimension inch 0.58 x 0.56 x 0.35   Cetflication CE CE	I/O Isolation Voltage(60sec), Input/Output	Vdc	3000
Switching Frequency     kHz, min     100       Hunidity     %, rel H     95       MTBF Reliability Calculated (MIL-HDBK-217F) at 25°C     Mhrs     >0.89       Renote on loff control     ON: Open or high impedance OFF: 24 ark input current/via 1k), OFF stand by input current(nominal Vin)3.0mA,max. UL/GUE 60950-1, 62368-1       Safety Standard (designed to meet)     °C     -40 ~ +75 (For 100% Load)       Operating Temperature     °C     -40 ~ +75 (For 100% Load)       Storage Temperature     °C     -55 ~ + 125       Cooling     Natural Convection     Natural Convection       Lead-free reflow solder process     IPC/JEDEC J-STD-020D.1     Reflow temperature peak       Vibration     VID. Conconductive Black plastic (UL94V-0 rated)     VID.       Vibration     MIL-STD-810F     Case Base Material     P0.5 mm C5191R+H Solder-coated       Weight     g     2.0     Storage Solder Solder Solder.     Que Solder Solder.       Dimension     mm     14.65 x 14.40 x 8.95     Dimension     Sols x 0.56 x 0.35       Certification     inch     0.58 x 0.56 x 0.35     Certification     Certification	I/O Isolation Capacitance	pF	25
Humidity %, rel H 95   MTBF Reliability Calculated (MIL-HDBK-217F) at 25°C Mhrs >0.89   Remote on/off control ON: Open or high impedance OFE: 2-4mA input current(via 1k), OFF stand by input current(nominal Vin)3.0mA,max.   Safety Standard (designed to meet) UL/CIL 60950-1, 62368-1 IEC/EN 60950-1, 62368-1   Operating Temperature °C 40 ~ +75 (For 100% Load)   Storage Temperature °C -55 ~ +125   Cooling Natural Convection Lead-free reflow solder process   ILead-free reflow solder process IPC/JEDEC J-STD-020D.1   Reflow temperature peak °C (10 sec,max) 245   Milssture Sensitivity Level Level 1   Vibration MIL-STD-810F   Case Base Material 9 2.0   Pin Material g 2.0   Dimension mm 14.65 x 14.40 x 8.95   Dimension inch 0.58 x 0.56 x 0.35   Certification CE	I/O Isolation Resistance	Ohm, min.	1G
MTBF Reliability Calculated (MIL-HDBK-217F) at 25°C Mhrs >0.89   Remote on/off control ON: Open or high impedance OFF: 2-4mA input current(ina 1k), OFF stand by input current(nominal Vin)3.0mA,max. UL/CLU 60990-1, 62368-1   Safety Standard (designed to meet) IEC/EN 80950-1, 62368-1   Operating Temperature °C 40 ~ +75 (For 100% Load)   Storage Temperature °C 40 ~ +75 (For 100% Load)   Storage Temperature °C -55 ~ +125   Cooling Natural Convection   Lead-free reflow solder process IPC/JEDEC J-STD-020D.1   Reflow temperature peak °C (10 sec,max) 245   Moisture Sensitivity Level Level 1   Vibration MIL-STD-810F   Case Base Material Po.5 mm C5191R-H Solder-coated   Weight g 2.0   Dimension mm 14.65 x 14.40 x 8.95   Dimension inch 0.58 x 0.56 x 0.35   Cetfication CE CE	Switching Frequency	kHz, min	100
Remote on/off control   ON: Open or high impedance OFF: 24mA input current(via 1k), OFF stand by input current(nominal Vin)3.0mA,max.     Safety Standard (designed to meet)   UL/CUL 60090-1, 62268-1 IEC/EN 60990-1, 62268-1     Operating Temperature   °C   40 - +75 (For 100% Load)     Storage Temperature   °C   -55 - +125     Cooling   Natural Convection     Lead-free reflow solder process   IPC/JEDEC J-STD-020D.1     Reflow temperature peak   °C (10 sec,max)   245     Moisture Sensitivity Level   Level 1     Vibration   MIL-STD-810F     Case Base Material   Non-conductive Black plastic (UL94V-0 rated)     Pin Material   \$0.5 mm C5191R-H Solder-coated     Weight   g   2.0     Dimension   mm   14.65 x 14.40 x 8.95     Dimension   inch   0.58 x 0.56 x 0.35     Certification   CE   CE	Humidity	%, rel H	95
Refinite officition     OFF: 2-4mA input current((via 1k), OFF stand by input current((nominal Vin)3.0mA,max.       Safety Standard (designed to meet)     IEC/EN 60950-1, 62368-1       Operating Temperature     °C     40 ~ +75 (For 100% Load)       Storage Temperature     °C     40 ~ +75 (For 100% Load)       Storage Temperature     °C     -55 ~ +125       Cooling     Natural Convection       Lead-free reflow solder process     IPC/JEDEC J-STD-020D.1       Reflow temperature peak     °C (10 sec,max)     245       Moisture Sensitivity Level     Level 1       Vibration     MIL-STD-810F       Case Base Material     von-conductive Black plastic (UL94V-0 rated)       Pin Material     g     2.0       Dimension     mm     14.65 x 14.40 x 8.95       Dimension     inch     0.58 x 0.56 x 0.35	MTBF Reliability Calculated (MIL-HDBK-217F) at 25°C	Mhrs	>0.89
Safety Standard (designed to meet) UL/cUL 60950-1, 62368-1 IEC/EN 60950-1, 62368-1   Operating Temperature °C -40 ~ +75 (For 100% Load)   Storage Temperature °C -55 ~ + 125   Cooling Natural Convection   Lead-free reflow solder process IPC/JEDEC J-STD-020D.1   Reflow temperature peak °C (10 sec,max) 245   Moisture Sensitivity Level Level 1   Vibration MIL-STD-810F   Case Base Material Non-conductive Black plastic (UL94V-0 rated)   Pin Material g 2.0   Dimension mm 14.65 x 14.40 x 8.95   Dimension inch 0.58 x 0.56 x 0.35	Remote on/off control		OFF: 2-4mA input current(via 1k), OFF stand by input current(nominal Vin)3.0mA,max.
Storage Temperature °C -55 ~ +125   Cooling Natural Convection   Lead-free reflow solder process IPC/JEDEC J-STD-020D.1   Reflow temperature peak °C (10 sec,max) 245   Moisture Sensitivity Level Level 1   Vibration ML-STD-810F   Case Base Material Non-conductive Black plastic (UL94V-0 rated)   Pin Material \$0.5 mm C5191R-H Solder-coated   Weight g 2.0   Dimension mm 14.65 x 14.40 x 8.95   Dimension inch 0.58 x 0.35   Certification CE	Safety Standard (designed to meet)		UL/cUL 60950-1, 62368-1
Cooling   Natural Convection     Lead-free reflow solder process   IPC/JEDEC J-STD-020D.1     Reflow temperature peak   °C (10 sec,max)   245     Moisture Sensitivity Level   Level 1     Vibration   MIL-STD-810F     Case Base Material   Non-conductive Black plastic (UL94V-0 rated)     Pin Material   q   0.5 mm C5191R-H Solder-coated     Weight   g   2.0     Dimension   mm   14.65 x 14.40 x 8.95     Dimension   inch   0.58 x 0.56 x 0.35     Cetification   CE	Operating Temperature	°C	-40 ~ +75 (For 100% Load)
Lead-free reflow solder process   IPC/JEDEC J-STD-020D.1     Reflow temperature peak   °C (10 sec,max)   245     Moisture Sensitivity Level   Level 1     Vibration   MIL-STD-810F     Case Base Material   Non-conductive Black plastic (UL94V-0 rated)     Pin Material   \$0.5 mm C5191R-H Solder-coated     Weight   g   2.0     Dimension   mm   14.65 x 14.40 x 8.95     Dimension   inch   0.58 x 0.56 x 0.35     Cetification   CE   CE	Storage Temperature	٥°	-55 ~ +125
Reflow temperature peak°C (10 sec,max)245Moisture Sensitivity LevelLevel 1VibrationMIL-STD-810FCase Base MaterialNon-conductive Black plastic (UL94V-0 rated)Pin Material\$0.5 mm C5191R-H Solder-coatedWeightg2.0Dimensionmm14.65 x 14.40 x 8.95Dimensioninch0.58 x 0.56 x 0.35CettificationCE	Cooling		Natural Convection
Moisture Sensitivity Level   Level 1     Vibration   MIL-STD-810F     Case Base Material   Non-conductive Black plastic (UL94V-0 rated)     Pin Material   \$\Phi 0.5 mm C5191R-H Solder-coated\$     Weight   g   2.0     Dimension   mm   14.65 x 14.40 x 8.95     Dimension   inch   0.58 x 0.56 x 0.35     Certification   CE	Lead-free reflow solder process		IPC/JEDEC J-STD-020D.1
Vibration   MIL-STD-810F     Case Base Material   Non-conductive Black plastic (UL94V-0 rated)     Pin Material   \$\overline{0.5 mm C5191R-H Solder-coated}     Weight   \$\overline{0.5 mm C5191R-H Solder-coated}     Dimension   mm   14.65 x 14.40 x 8.95     Dimension   inch   0.58 x 0.56 x 0.35     Certification   CE	Reflow temperature peak	°C (10 sec,max)	245
Case Base Material   Non-conductive Black plastic (UL94V-0 rated)     Pin Material   \$\Phi 0.5 mm C5191R-H Solder-coated\$     Weight   g   2.0     Dimension   mm   14.65 x 14.40 x 8.95     Dimension   inch   0.58 x 0.56 x 0.35     Certification   CE	Moisture Sensitivity Level		Level 1
Pin Material   Φ 0.5 mm C5191R-H Solder-coated     Weight   g   2.0     Dimension   mm   14.65 x 14.40 x 8.95     Dimension   inch   0.58 x 0.56 x 0.35     Certification   CE	Vibration		MIL-STD-810F
Weight     g     2.0       Dimension     mm     14.65 x 14.40 x 8.95       Dimension     inch     0.58 x 0.56 x 0.35       Certification     CE	Case Base Material		Non-conductive Black plastic (UL94V-0 rated)
Dimension     mm     14.65 x 14.40 x 8.95       Dimension     inch     0.58 x 0.56 x 0.35       Certification     CE	Pin Material		Φ 0.5 mm C5191R-H Solder-coated
Dimension inch 0.58 x 0.56 x 0.35   Certification CE	Weight	g	2.0
Certification CE	Dimension	mm	14.65 x 14.40 x 8.95
	Dimension	inch	0.58 x 0.56 x 0.35
Packing Unit pcs. 30 Tube / 200 Reel	Certification		CE
	Packing Unit	pcs.	30 Tube / 200 Reel

### **REMARKS:**

"Cooling": 'Nature Convection' is usually about 30-65 LFM but it's not equal to still air (0 LFM).

The information & specifications contained in this data sheet are believed to be corrected at time of publication. PEAK electronics accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subjected to change without notice. No rights under any patent accompany the sale of any such products or information contained herein.



### **SMD SERIES**

2 WATT Regulated Dual Output DC/DC Converter

Mainzer Str. 151-153 D-55299 Nackenheim +49(0)6135 70260 www.peak-electronics.de

# PEAK PIGMC XXXXK

# EMC Characteristics

**SMD 12 PIN Package** 

Conducted Emissions	EN 55032	CLASS A
ESD	IEC61000-4-2	Perf. Criteria A
RS	IEC61000-4-3	Perf. Criteria A
EFT	IEC61000-4-4	Perf. Criteria A
Surge	IEC61000-4-5	Perf. Criteria A
CS	IEC61000-4-6	Perf. Criteria A
PFMF	IEC61000-4-8	Perf. Criteria A
Radiated Emissions	EN 55032	CLASS A

Special Characteristics		
Stress rating: Input Surge Voltage (100ms)	12 Models: 25 24 Models: 50	Vdc, max.
Soldering Temperature (1.5mm from case 10sec. max)	260	°C, max.

### **REMARKS:**

"EFT"/"Surge": An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.

### **REMARKS:**

Stress rating characteristics: Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

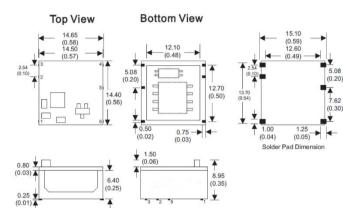
Product Overview								
ART CODE	Input Voltage Range	Input Current No load	Input Current Full Load	Output Voltage	Output Current Min. Load	Output Current Full Load	Efficiency @FL	Capacitive Load
	Vdc	mA, max.	mA, typ.	Vdc	mA, min.	mA, max.	%	μF, max.
P10SMD-1212Z4:1	12 (4.5-18)	50	211	±12	0	±83.3	79	±100
P10SMD-1215Z4:1	12 (4.5-18)	50	206	±15	0	±66.7	81	±47
P10SMD-2412Z4:1	24 (9-36)	30	105	±12	0	±83.3	79	±100
P10SMD-2415Z4:1	24 (9-36)	30	103	±15	0	±66.7	81	±47
P10SMD-1212Z4:1-R	12 (4.5-18)	50	211	±12	0	±83.3	79	±100
P10SMD-1215Z4:1-R	12 (4.5-18)	50	206	±15	0	±66.7	81	±47
P10SMD-2412Z4:1-R	24 (9-36)	30	105	±12	0	±83.3	79	±100
P10SMD-2415Z4:1-R	24 (9-36)	30	103	±15	0	±66.7	81	±47

\*P10SMD-xxxx4:1-R = Tape & Reel (contains 200pcs)

The information & specifications contained in this data sheet are believed to be corrected at time of publication. PEAK electronics accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subjected to change without notice. No rights under any patent accompany the sale of any such products or information contained herein.



### **Technical Drawings**

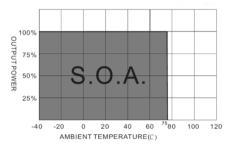


PIN	DUAL	
1	+V Input	
2	-V Input	
3	Remote on/off	
4	+V Output	
5	Common	
6	-V Output	

**EFT/Surge Filter** 

C1

PIN Connections / Derating Curve

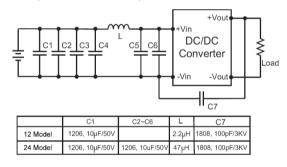


All dimensions are typical in millimeters ( inches ) Pin pitch and length tolerance:  $\pm 0.25$  (  $\pm 0.014$  )

### **Application Notes**

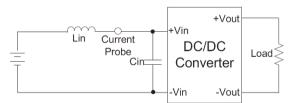
#### EMI Filter

Input filter components (C1,L,C2) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module and all leads should be minimized to decrease radiated noise



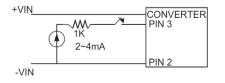
### Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor Lin(12µH) and a source capacitor Cin(47µF, ESR<1.0Ω at 100KHz) at nominal input and full load.



#### Remote ON / OFF Test Step

Input current (2~4mA) via 1K $\Omega$  to Pin3 , converter OFF. open or high impedance , converter ON.



### Output Ripple & Noise Measurement Test

Input filter components (C1) is used to help meet IEC61000-4-4 and IEC61000-4-5

DC/DC

Converter

+Vout

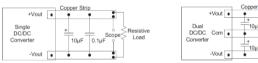
-Vout

Load

+Vin

-Vin

Use a 10µF electrolytic capacitor and 0.1µF ceramic capacitor. The Scope measurement bandwidth is 20MHz.



	Copper Strip	
+Vout •		
Dual	10μF0.1μF °	Scope SResistive
DC/DC Com		< Load
Converter	10μF0.1μF ♀	Scope
-Vout •		

C1

330µF,100V

330µF,100V

12 Models

24 Models

The information & specifications contained in this data sheet are believed to be corrected at time of publication. PEAK electronics accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subjected to change without notice. No rights under any patent accompany the sale of any such products or information contained herein.