



Features

- 4:1 wide input voltage range
- High efficiency up to 90.0%
- No-load power loss as low as 0.15W
- 1,500Vdc input to output isolation
- Input under-voltage, output over-current, over-voltage and short-circuit protections
- Operating temperature range: -40 to +85 °C
- Industry standard pin-out
- UL 60950-1 2nd edition recognized



Part Numbering System

LM	x	x	xxx	P	20W	1	LD	C
Series Name	No. of Output	Input Range	Output Voltage	Enable Logic	Output Power	Isolation Voltage	Package	Version No.
	B: Dual S: Single	1: 9-36V 3: 18-75V	Example: 050: 5V	P: Positive	20W: 20W	1: 1500Vdc	LD: 2x1	C: Version No.

Selection Guide

Part No.	Input Voltage (Vdc)	Output		Efficiency(%) at typical input & full load	Max. Load Capacitance (µF)
		Voltage(Vdc)	Current(mA)		
LMB1050P20W1LDC	24 (9-36)	±5	±2000	86.0	4800
LMB1090P20W1LDC		±9	±1111	88.0	1000
LMB1120P20W1LDC		±12	±834	88.0	800
LMB1150P20W1LDC		±15	±667	88.0	625
LMS1033P20W1LDC		3.3	5000	86.0	10000
LMS1050P20W1LDC		5	4000	88.0	10000
LMS1090P20W1LDC		9	2222	89.0	4700
LMS1120P20W1LDC		12	1667	89.0	1600
LMS1150P20W1LDC		15	1333	90.0	1000
LMS1240P20W1LDC		24	834	90.0	500
LMB3050P20W1LDC	48 (18-75)	±5	±2000	86.0	4800
LMB3120P20W1LDC		±12	±834	88.0	800
LMB3150P20W1LDC		±15	±667	89.0	625
LMS3033P20W1LDC		3.3	5000	86.0	10000
LMS3050P20W1LDC		5	4000	86.0	10000
LMS3090P20W1LDC		9	2222	89.0	4700
LMS3120P20W1LDC		12	1667	87.0	1600
LMS3150P20W1LDC		15	1333	90.0	1000
LMS3240P20W1LDC		24	834	88.0	500

Input Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit	
Input Current (full load)	24Vdc input series	3.3V output	-	799	818	mA
		5V output	-	969	993	
		Others	-	947	969	
	48Vdc input series	3.3V output	-	400	409	
		5V output	-	485	497	
		Others	-	474	485	
Input Current (zero load)	24Vdc input series	3.3V output	-	40	45	
		5V output	-	40	80	
		Others	-	6	10	
	48Vdc input series	3.3V output	-	20	25	
		5V output	-	20	60	
		Others	-	5	9	
Reflected Ripple Current	Full input range	-	30	-		
Surge Voltage (1sec. max.)	24Vdc input series	-0.7	-	50	Vdc	
	48Vdc input series	-0.7	-	100		
Starting Voltage	24Vdc input series	-	-	9		
	48Vdc input series	-	-	18		
Input Under-voltage protection	24Vdc input series	5.5	6.5	-		
	48Vdc input series	12	15.5	-		
Starting Time	Nominal input voltage & constant resistive load	-	10	-	ms	
Ctrl*	Module turn-on	Ctrl pin floating or connected to TTL high level(3.5-12Vdc)				
	Module turn-off	Ctrl pin connected to Vin(-) or low level(0-1.2Vdc)				
	Current for turn-off	-	4	7	mA	
Hot Plugging	Not supported					

*The voltage at Ctrl is referenced to Vin(-).

Output Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit	
Output Voltage Accuracy		-	±1	±3	%Vo	
Line Regulation	Full range input voltage, full load	+Vout	-	±0.2		±0.5
		-Vout	-	±0.5		±1
Load Regulation	5%-100% of full load, nominal input	+Vout	-	±0.5		±1
		-Vout	-	±0.5		±1.5
Cross Regulation	Dual output, main circuit with 50% load, auxiliary circuit with 10%-100% of full load	-	-	±5		
Temperature Coefficient	Full load	-	-	0.03	%/°C	
Transient Recovery Time		-	300	500	µs	
Transient Response Deviation	25% load step, nominal input voltage	3.3V/5V/±5V output	-	±5	±8	%Vo
		Others	-	±3	±5	
Ripple & Noise	20MHz bandwidth	-	50	100	mVp-p	
Ripple Frequency*		-	270	-	kHz	

Trim	Full input range	90	-	110	%Vo
Over-voltage Protection		110	-	160	
Over-current Protection		110	-	190	%Io
Short circuit Protection		Hiccup mode, continuous, auto-recovery			

*The ripple frequency decreases as the load decreases at 50% or less of the full load.

Safety and Environmental Specifications

Parameter	Notes & Conditions	Min	Typical	Max	Unit	
Isolation Voltage	Input-Output, 1 minute, leakage current less than 1mA	1,500	-	-	Vdc	
Insulation Resistance	Input-Output, isolation voltage 500Vdc	1,000	-	-	MΩ	
Isolation Capacitance	Input-Output, 100KHz/0.1V	LMS1240P20W1LDC	-	2,050	-	pF
		Others	-	1,050	-	
Operating Temperature		-40	-	+85	°C	
Storage Temperature		-55	-	+125		
Storage Humidity	Non-condensing	5	-	95	%RH	
Vibration		10-55Hz, 10G, 30 min. along X, Y and Z				
MTBF	MIL-HDBK-217F@25°C	1	-	-	10 ⁶ hours	

Note: Unless otherwise specified, data in this datasheet should be tested under the conditions of nominal input voltage, rated load and Ta=25°C.

Other Specifications

Parameter	Notes
Case Material	Aluminum alloy
Dimensions	50.80 x 25.40 x 11.80 mm
Weight	25g (Typ.)
Cooling Method	Free air convection

EMC Specifications

Parameter	Notes & Conditions		
EMI	CE	CISPR32/EN55032 CLASS A (Without extra components) / CLASS B (See Figure 6-②)	
	RE	CISPR32/EN55032 CLASS A (Without extra components) / CLASS B (See Figure 6-②)	
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (See Figure 6-①)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2KV (See Figure 6-①)	perf. Criteria B
	CS	IEC/EN61000-4-6 3Vrms	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29 0%, 70%	perf. Criteria B

Characteristic Curves

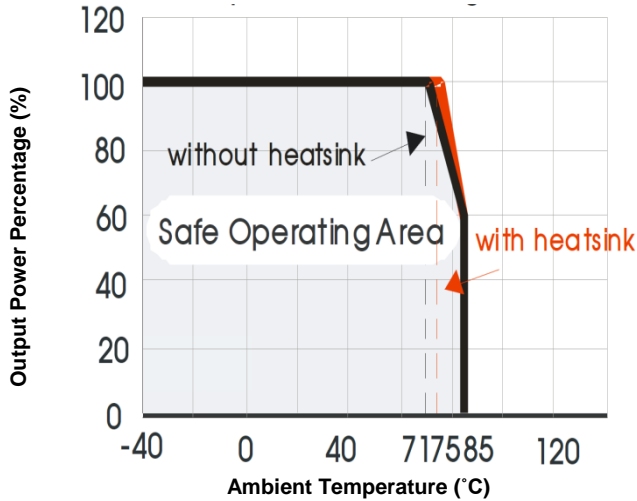


Figure 1. Temperature Derating Curve

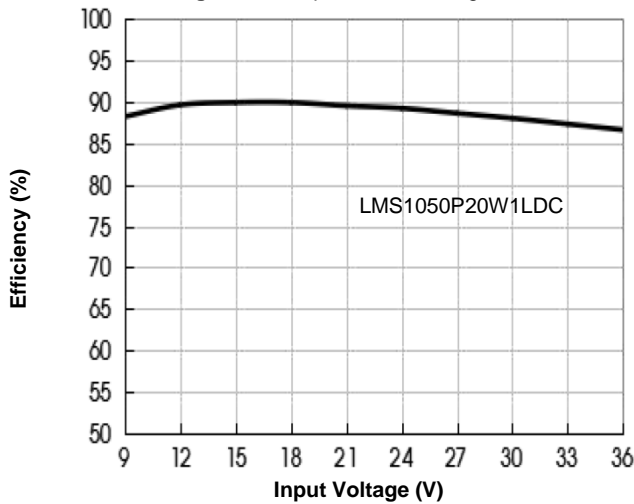


Figure 2. Efficiency vs. Input Voltage (full load)

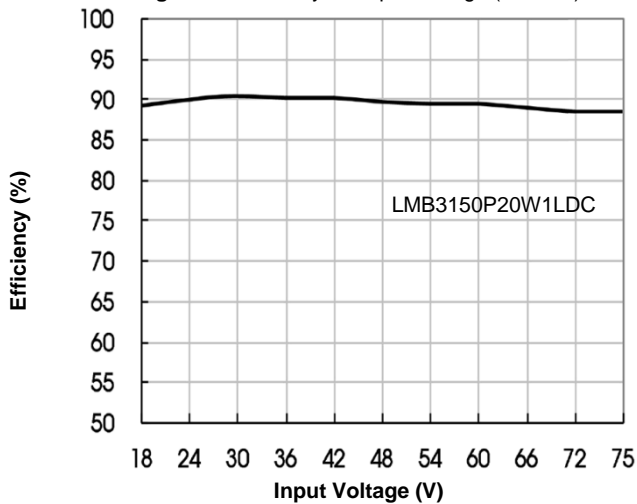


Figure 4. Efficiency vs. Input Voltage (full load)

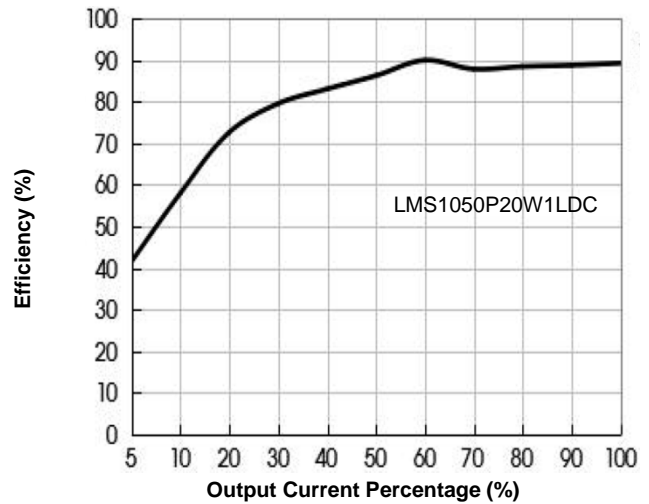


Figure 3. Efficiency vs. Output Load (Vin=24V)

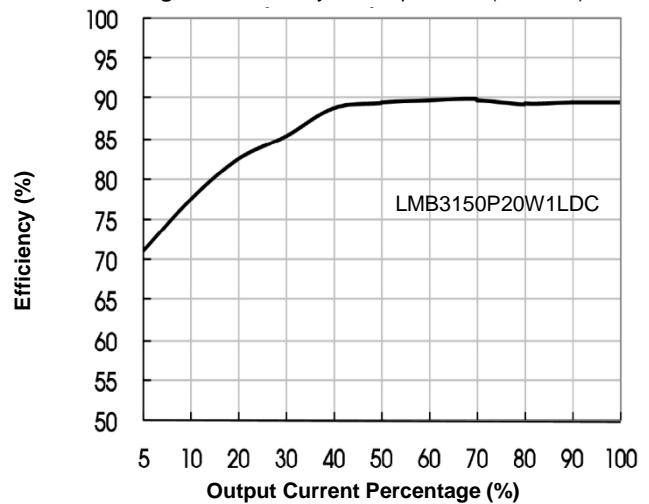
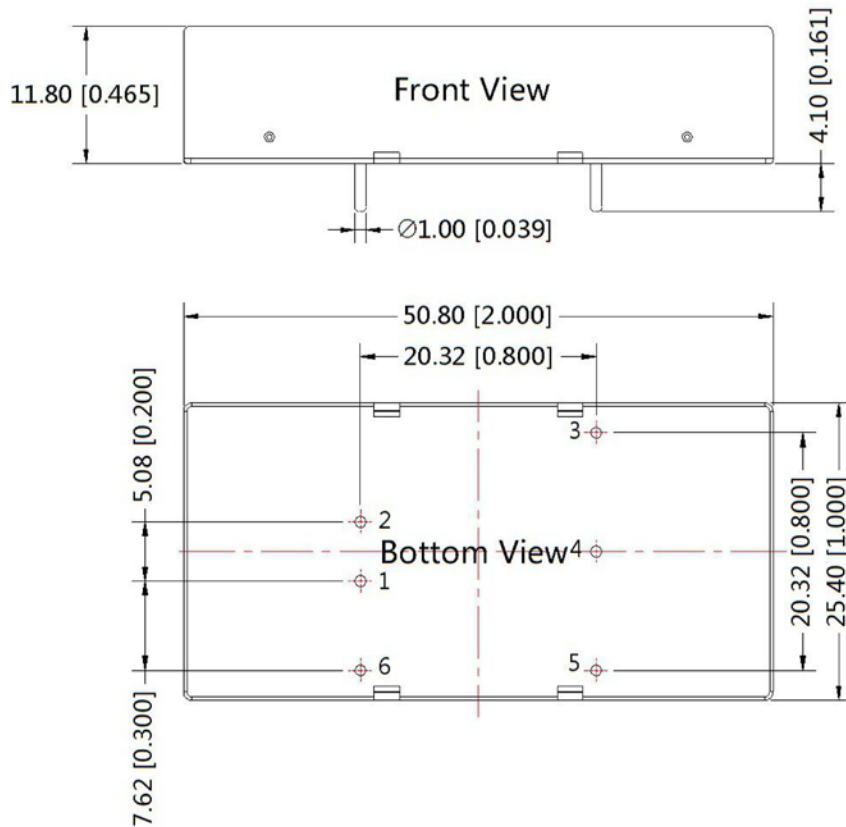


Figure 5. Efficiency vs. Output Load (Vin=48V)

Mechanical Drawing


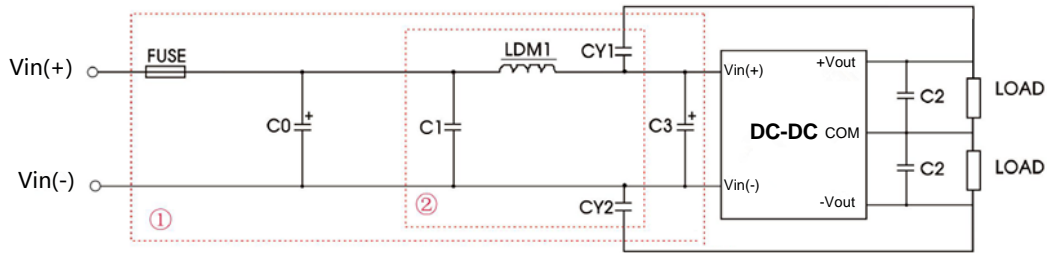
Single output		
Pin	Name	Function
1	Vin(-)	Negative input voltage
2	Vin(+)	Positive input voltage
3	Vout(+)	Positive output voltage
4	Trim	Output voltage adjustment
5	Vout(-)	Negative output voltage
6	Ctrl	On/Off control
Dual output		
Pin	Name	Function
1	Vin(-)	Negative input voltage
2	Vin(+)	Positive input voltage
3	+Vout	Positive output voltage
4	COM	Output common GND
5	-Vout	Negative output voltage
6	Ctrl	On/Off control

Notes:

- 1) All dimension in mm(inches)
Tolerances: $\pm 0.50(\pm 0.020)$
- 2) Pin section tolerances : $\pm 0.10(\pm 0.004)$

EMC Typical Application Circuit

Dual output:



Single output:

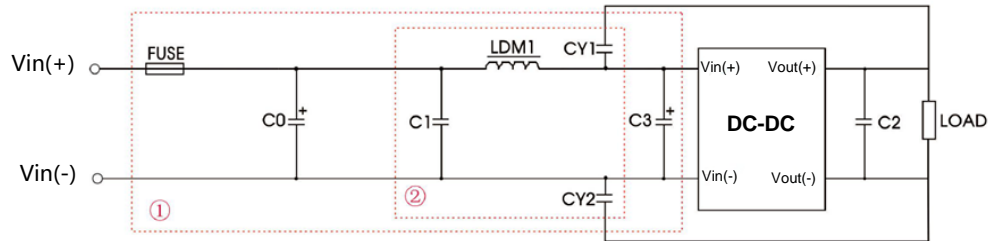
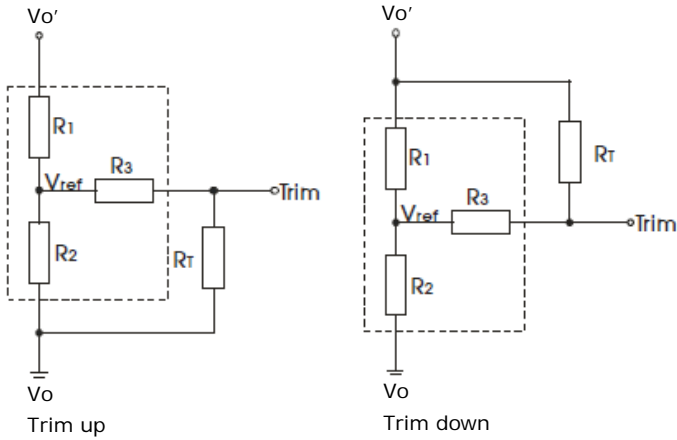


Figure 6. EMC Recommended Circuit

Component	Recommended Value	
	24Vin	48Vin
FUSE	Choose according to the actual input current	
C0/C3	330 μ F/50V	330 μ F/100V
C1	1 μ F/50V	1 μ F/100V
C2	470 μ F(3.3/5Vo) / 220 μ F(\pm 5/9/12/15Vo) / 100 μ F(\pm 9/ \pm 12/ \pm 15/24Vo)	
LDM1	4.7 μ H/3.1A	
CY1/CY2	1nF/2KV	

Trim Function



Formula of Trim Resistance:

$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3 \quad \alpha = \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3 \quad \alpha = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2$$

Notes:

R_T : Trim Resistor

α : User-defined parameter, no actual meanings

$V_{o'}$: The trim up/down voltage

Figure 7. Trim Function

V_{out}	$R_1(k\Omega)$	$R_2(k\Omega)$	$R_3(k\Omega)$	$V_{ref}(V)$
3.3V	4.801	2.87	12.4	1.24
5V	2.883	2.87	10	2.5
9V	7.5	2.87	15	2.5
12V	11	2.87	15	2.5
15V	14.494	2.87	15	2.5
24V	24.872	2.87	17.8	2.5