Features

- 4:1 wide input voltage range
- High efficiency up to 89.0%
- No-load power loss as low as 0.12W
- 3,000Vdc 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	S	x	xxx	P	20W	3	LP	C
Series Name	**No. of Output**	**Input Range**	**Output Voltage**	**Enable Logic**	**Output Power**	**Isolation Voltage**	**Package**	**Version No.**
	S: Single	**1:** 9-36V **3:** 18-75V	**Example:** **050:** 5V	**P:** Positive	**20W:** 20W	**3:** 3000Vdc	**LP:** LP package	**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)		
LMS1033P20W3LPC	24 (9-36)	3.3	5000	86.0	10000
LMS1050P20W3LPC		5	4000	89.0	10000
LMS1090P20W3LPC		9	2222	88.0	4700
LMS1120P20W3LPC		12	1667	88.0	1600
LMS1150P20W3LPC		15	1334	89.0	1000
LMS1240P20W3LPC		24	833	89.0	500
LMS3033P20W3LPC	48 (18-75)	3.3	5000	86.0	10000
LMS3050P20W3LPC		5	4000	88.0	10000
LMS3120P20W3LPC		12	1667	88.0	1600
LMS3150P20W3LPC		15	1334	89.0	1000
LMS3240P20W3LPC		24	833	89.0	500

Input Specifications

Parameter	Notes & Conditions		Min	Typical	Max	Unit
Input Current(full load)	24Vdc input series	3.3V output	-	799	819	
		5V output	-	936	958	mA
		Others	-	947	969	
	48Vdc input series	3.3V output	-	400	410	
		5V output	-	473	485	
		Others	-	473	485	
Input Current (zero load)	24Vdc input series	3.3V output	-	40	45	
		5V output	-	40	45	
		Others	-	10	20	
	48Vdc input series	3.3V output	-	20	25	
		5V output	-	20	25	
		Others	-	5	8	
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		-	±0.2	±0.5	%Vo
Load Regulation	0%-100% of full load, nominal input		-	±0.5	±1	%Vo
Temperature Coefficient	Full load		-	-	0.03	%/°C
Transient Recovery Time	25% load step, nominal input voltage		-	300	500	μs
Transient Response Deviation		3.3V/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	3,000	-	-	Vdc
Insulation Resistance	Input-Output, isolation voltage 500Vdc	1,000	-	-	MΩ
Isolation Capacitance	Input-Output, 100KHz/0.1V	-	500	-	pF
Operating Temperature		-40	-	+85	°C
Storage Temperature		-55	-	+125	
Storage Humidity	Non-condensing	5	-	95	%RH
Vibration		10-55Hz, 2G, 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	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	51.50 x 26.50 x 12.00 mm
Weight	23.7g (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

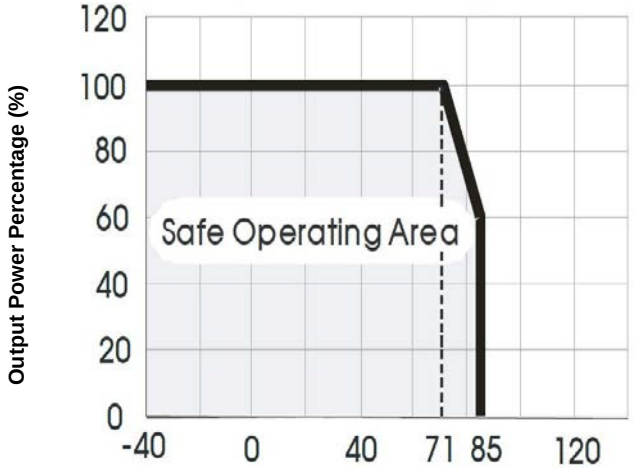


Figure 1. Temperature Derating Curve

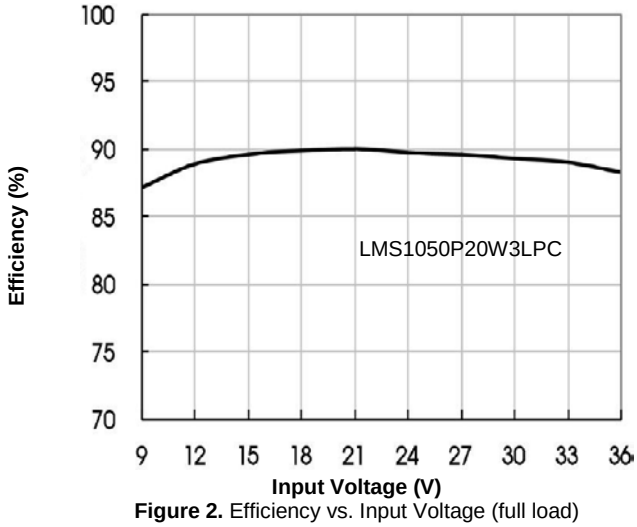


Figure 2. Efficiency vs. Input Voltage (full load)

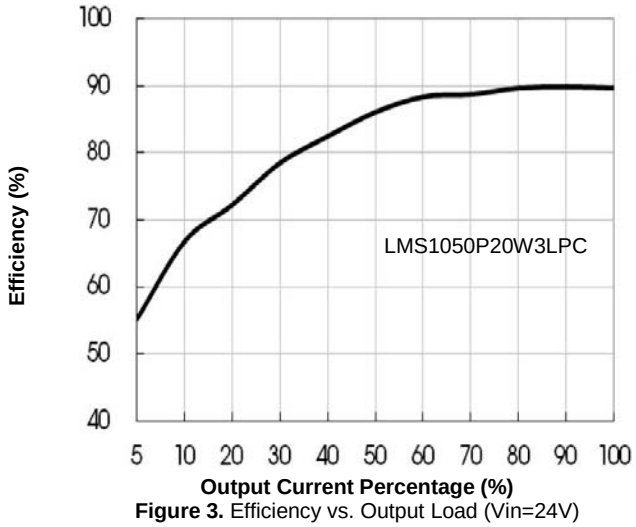


Figure 3. Efficiency vs. Output Load (Vin=24V)

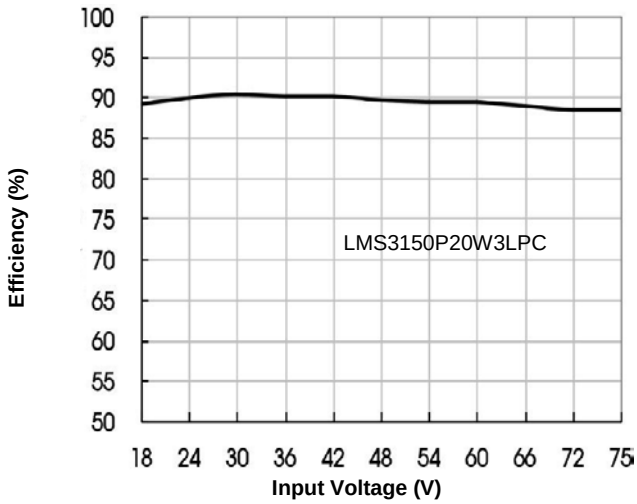


Figure 4. Efficiency vs. Input Voltage (full load)

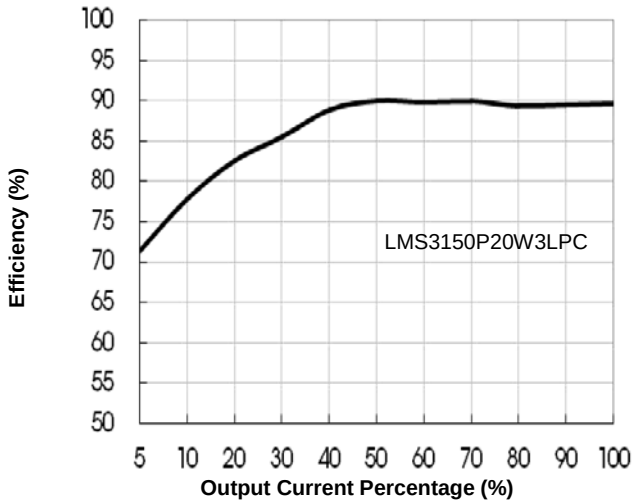
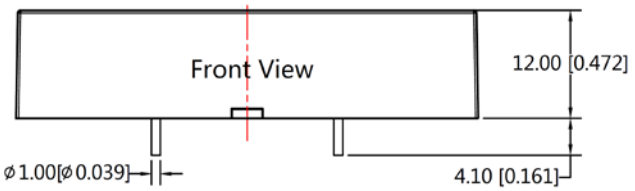
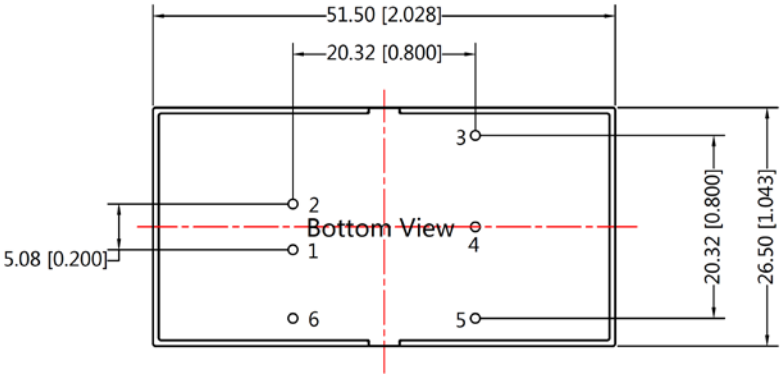


Figure 5. Efficiency vs. Output Load (Vin=48V)

Mechanical Drawing





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

Notes:

1) All dimension in mm(inches)
   Tolerances: ±0.50(±0.020)
2) Pin section tolerances : ±0.10(±0.004)

EMC Typical Application Circuit

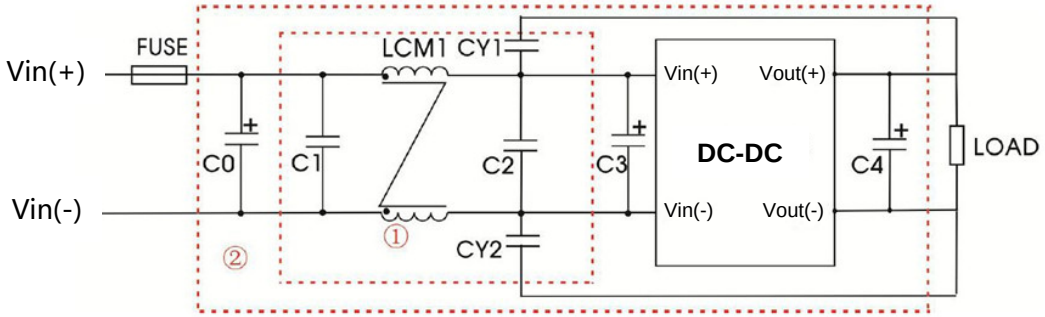
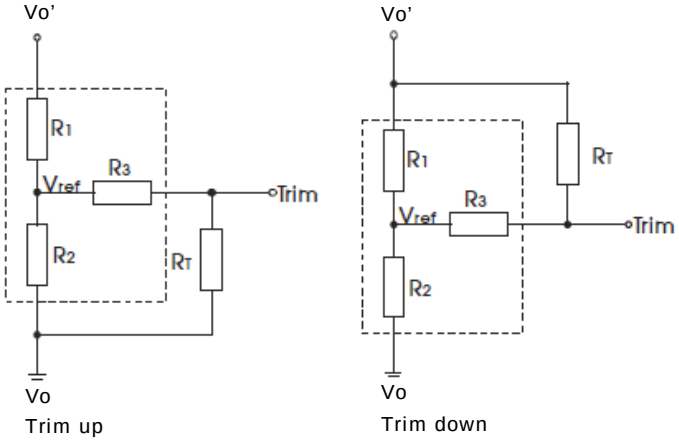


Figure 6. EMC Recommended Circuit

Component	Recommended Value	
	24Vin	48Vin
FUSE	Choose according to the actual input current	
C0	1000μF/50V	680μF/100V
C1/C2	1μF/50V	1μF/100V
C3	330μF/50V	330μF/100V
C4	470μF(3.3/5Vo) / 220μF(9/12/15Vo) / 100μF(24Vo)	
LCM1	6.8mH	
CY1, CY2	1nF/3KV	

Trim Function



Formula of Trim Resistance:

up: $R_T = \frac{aR_2}{R_2-a} - R_3$ $\quad a = \frac{Vref}{Vo'-Vref} \cdot R_1$

down: $R_T = \frac{aR_1}{R_1-a} - R_3$ $\quad a = \frac{Vo'-Vref}{Vref} \cdot R_2$

Notes:
R_T: Trim Resistor
a: User-defined parameter, no actual meanings
Vo': The trim up/down voltage

Figure 7. Trim Function

V_{out}	R_1(kΩ)	R_2(kΩ)	R_3(kΩ)	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