140kHz 80V 2A Buck DC to DC Converter XL7057

Features

- Operating Voltage: 12V~72V
- 2A Constant Output Current Capability
- Max. IOUT=1.8A at VOUT=5V
- Max. IOUT=1.5A at VOUT=12V
- High Light-Load Efficiency
- High efficiency up to 93%
- Built in power MOSFET
- Feedback Voltage Accuracy ±2%
- Excellent line and load regulation
- Built in thermal shutdown function
- Built in current limit protection function
- Temperature Grade 1: -40℃ to 125℃ Ambient Operating Temperature Range
- Device HBM ESD Classification Level Class3A
- Available in TO252-5L package

General Description

The XL7057 is a 140 kHz fixed frequency buck DC/DC converter, capable of driving a 2A load with high voltage, high efficiency. A built-in loop compensation module reduces components in the system, lowering power system cost and reducing printed circuit board space. The XL7057 has built-in thermal shutdown, current limit protection and so on.

Applications

- POE Switch
- Automotive Electronics
- Industrial Control
- Networking Equipment
- Internet of Things

Typical application schematic

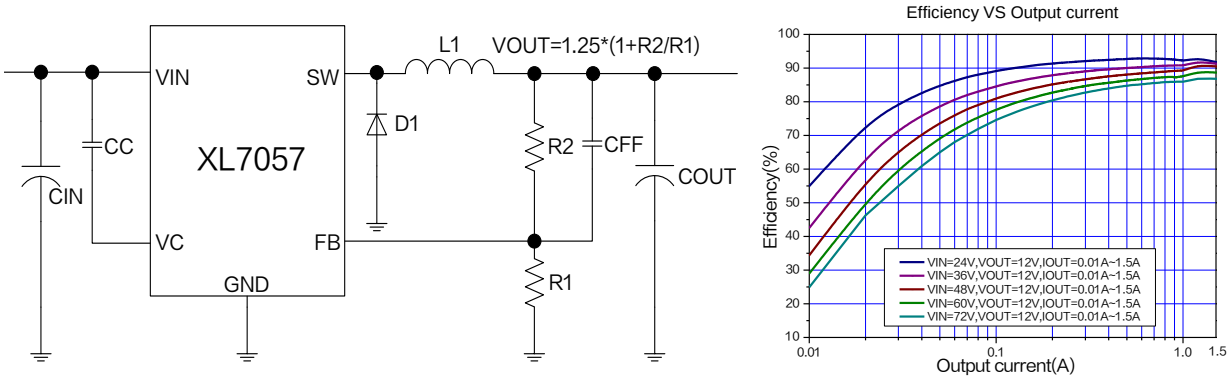


Figure1.XL7057 Typical application schematic and efficiency curve

Pin Configurations

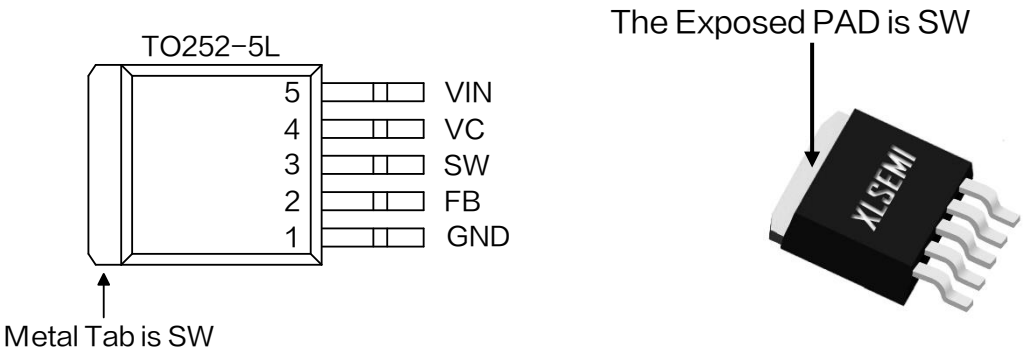


Figure2.Pin Configuration of XL7057

Table 1.Pin Description

Pin Number	Pin Name	Description
1	GND	Ground Pin.
2	FB	Feedback Pin (FB). Through an external resistor divider network, detects the output voltage for adjustment, with an adjustable version reference voltage of 1.25V.
3	SW	Power Switch Output Pin (SW).
4	VC	Internal Voltage Regulator Bypass Capacity. In typical system application, The VC pin connect a 0.1μF capacitor to VIN
5	VIN	Supply Voltage Input Pin. XL7057 DC operating voltage range from a 12V to 72V. Bypass VIN to GND with a suitably large capacitor to eliminate noise on the input.

Ordering Information

Order Information	Marking ID	Package Type	Eco Plan	Packing Type Supplied As
XL7057	XL7057	TO252-5L	RoHS & HF	2500 Units on Reel

Function Block

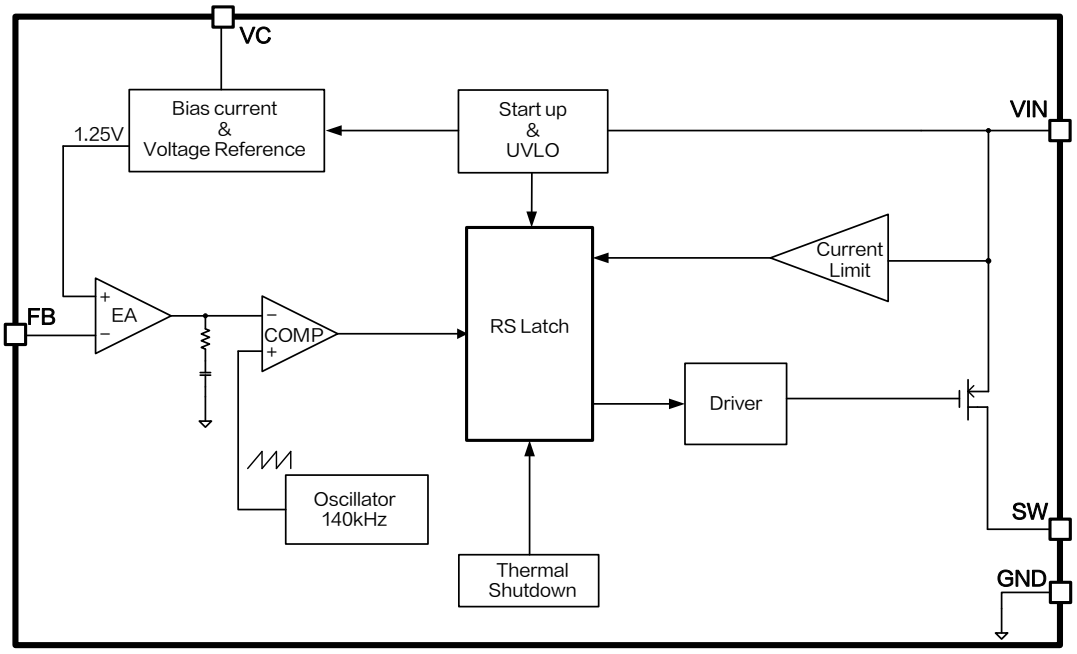


Figure3.Function Block Diagram of XL7057

Absolute Maximum Ratings (Note1)

Parameter	Symbol	Value	Unit
Input Voltage	V_{IN}	−0.3~80	V
Feedback Pin Voltage	V_{FB}	−0.3~7	V
VC Pin Voltage	V_C	V_{IN}−7~V_{IN}	V
Output Switch Pin Voltage	V_{SW}	−0.3~V_{IN}	V
Power Dissipation	P_D	Internally limited	mW
Thermal Resistance (TO252−5L) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	50	°C /W
Operating Junction Temperature	T_J	−40~150	°C
Storage Temperature	T_{STG}	−65~150	°C
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	°C
ESD (HBM)	−	≥4000	V

Note1: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

XL7057 Electrical Characteristics

T_A = 25℃; System parameters test circuit figure4 and figure6, unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{FB}	Feedback Voltage	V_{IN}=18V-72V, V_{OUT}=12V I_{OUT} =0.5A	1.225	1.25	1.275	V
η	Efficiency	V_{IN}=24V，V_{OUT}=5.0V I_{OUT}=1.8A	-	82.4	-	%
η	Efficiency	V_{IN}=24V，V_{OUT}=12V I_{OUT}=1.5A	-	92.2	-	%
η	Efficiency	V_{IN}=36V，V_{OUT}=5.0V I_{OUT}=1.8A	-	80.8	-	%
η	Efficiency	V_{IN}=36V，V_{OUT}=12V I_{OUT}=1.5A	-	91.5	-	%
η	Efficiency	V_{IN}=48V，V_{OUT}=5.0V I_{OUT}=1.8A	-	82.3	-	%
η	Efficiency	V_{IN}=48V，V_{OUT}=12V I_{OUT}=1.5A	-	90.6	-	%

Electrical Characteristics (DC Parameters)

T_A = 25℃, V_{IN} = 48V, System parameters test circuit figure6, unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating Voltage	V_{IN}	-	20	-	72	V
Quiescent Current	I_Q	V_{FB}=2V	-	1.7	2.5	mA
Oscillator Frequency	F_{OSC}	-	110	140	170	kHz
Switch Current Limit	I_L	-	-	3.5	-	A
MOS On-resistance	$R_{DS(ON)}$	V_{IN}=48V I_{SW}=1.0A	-	300	-	mΩ
Max. Duty Cycle	D_{MAX}	V_{FB}=0V	-	90	-	%
Thermal Shutdown Temperature	T_{SD}	-	-	150	-	℃

Typical System Application Schematic (V_{OUT}=5V, I_{OUT}=0~1.8A)

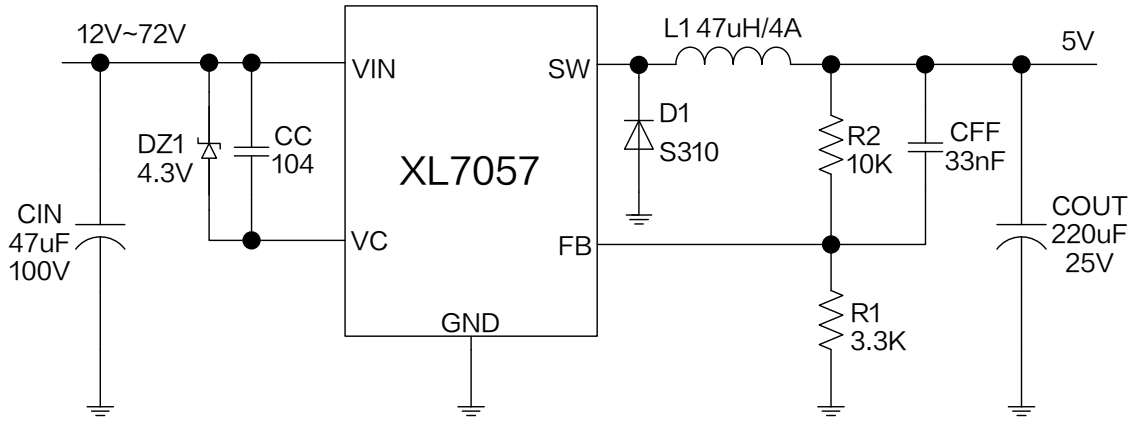


Figure4. XL7057 System Parameters Test Circuit (V_{IN}=12V~72V, V_{OUT}=5V, I_{OUT}=0~1.8A)

Typical System Application Transfer Efficiency

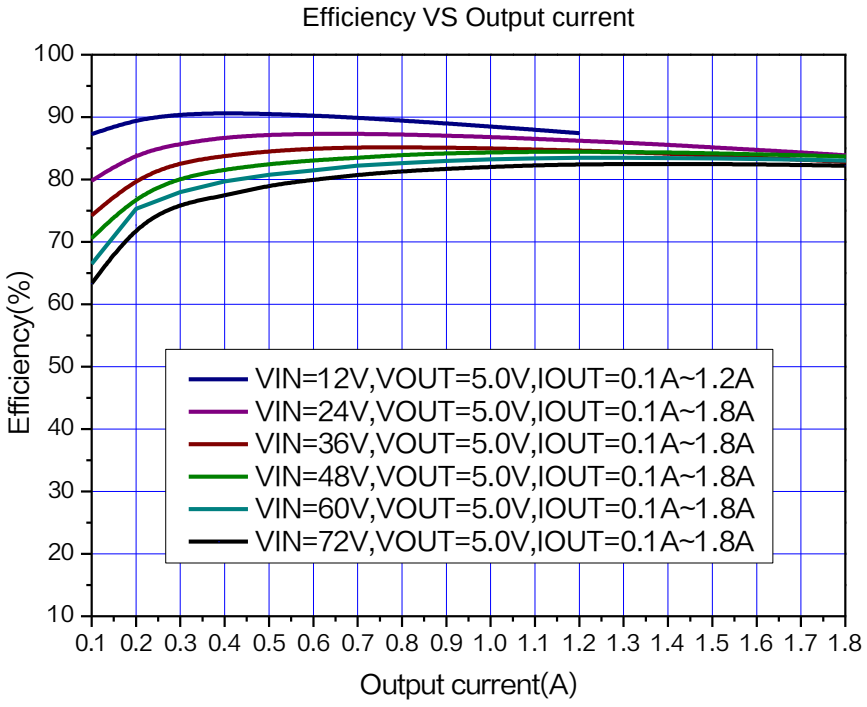


Figure5.XL7057 System Efficiency Curve (V_{OUT}=5.0V)

Typical System Application Schematic (V_{OUT}=12V, I_{OUT}=0~1.5A)

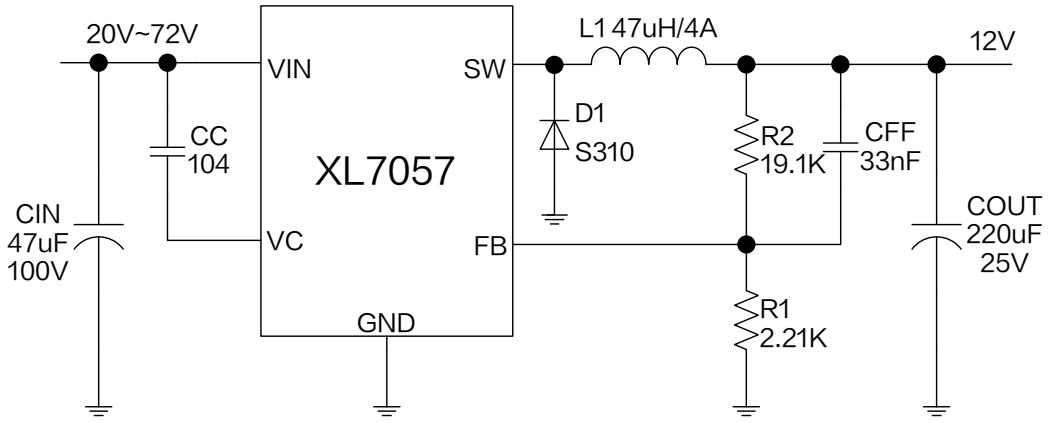


Figure6.XL7057 System Parameters Test Circuit (V_{IN}=20V~72V，V_{OUT}=12V，I_{OUT}=0~1.5A)

Typical System Application Transfer Efficiency

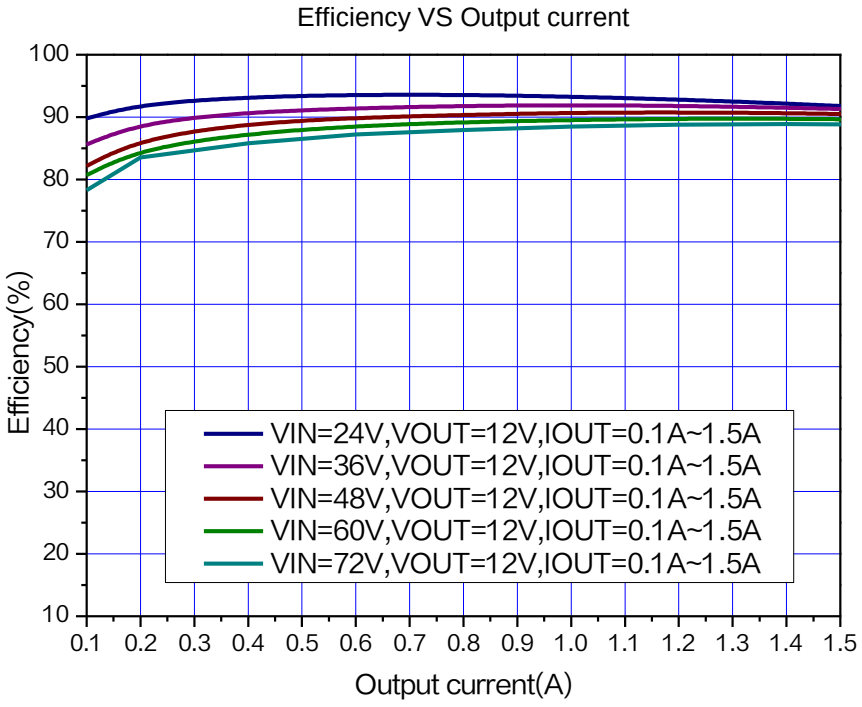


Figure7.XL7057 System Efficiency Curve (V_{OUT}=12V)

Typical Characteristics

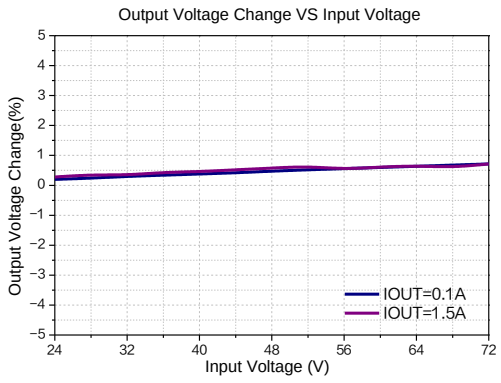


Figure8.Line Regulation

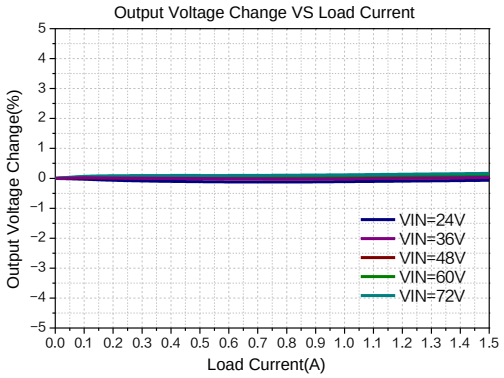


Figure9.Load Regulation

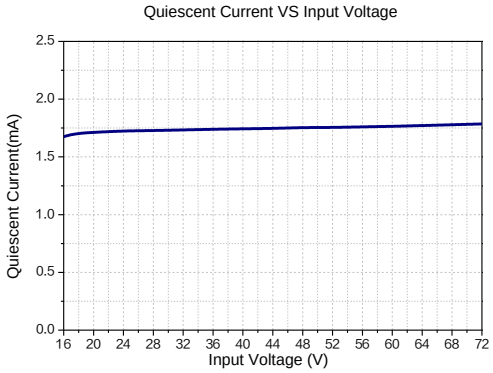


Figure10.Quiescent Current

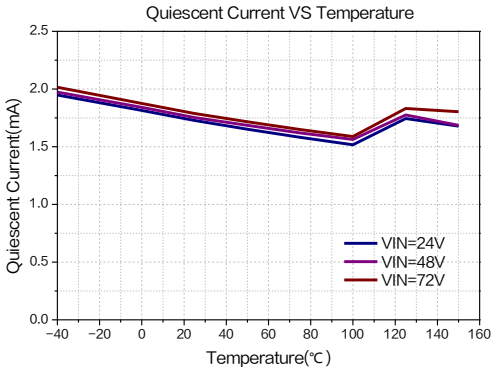


Figure11.Quiescent Current

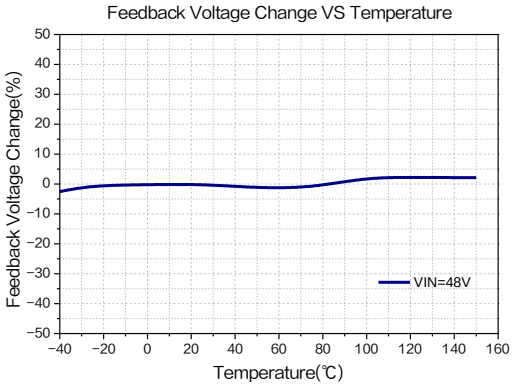


Figure12.Feedback Voltage Regulation

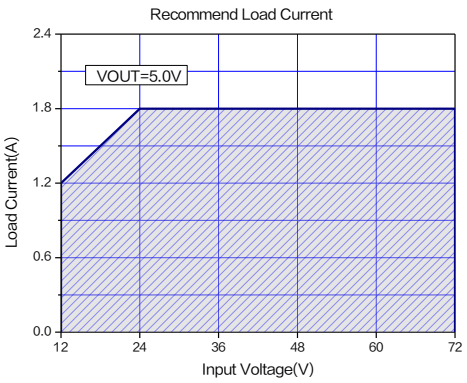


Figure 13.Max Output Current
(V_{OUT}=5.0V, T_A=25℃)

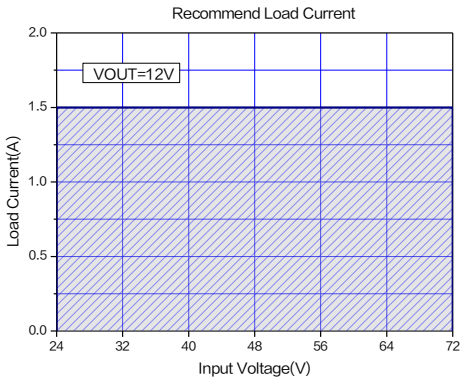


Figure 14.Max Output Current
(V_{OUT}=12V, T_A=25℃)

Figure 15. Start-Up Characteristic
(V_{IN}=24V, V_{OUT}=12V, I_{OUT}=0.1A)

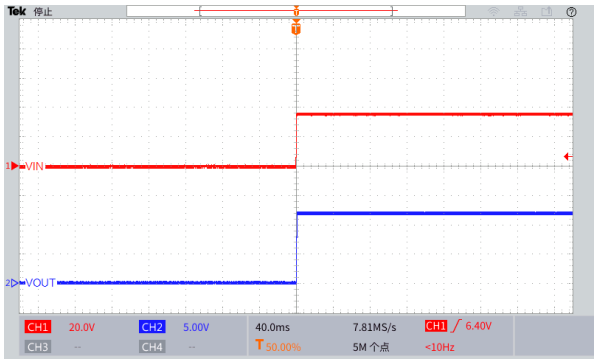


Figure 16. Start-Up Characteristic
(V_{IN}=36V, V_{OUT}=12V, I_{OUT}=0.1A)

Figure 17. Start-Up Characteristic
(V_{IN}=48V, V_{OUT}=12V, I_{OUT}=0.1A)

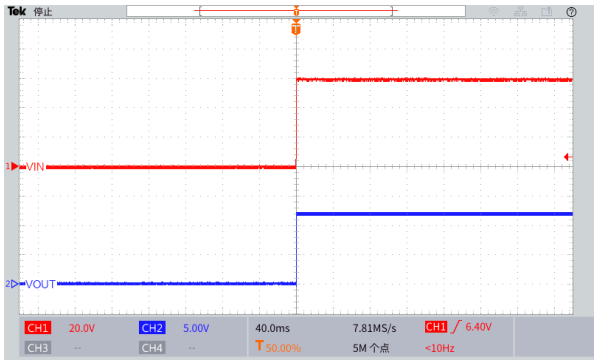


Figure 18. Start-Up Characteristic
(V_{IN}=60V, V_{OUT}=12V, I_{OUT}=0.1A)

Figure 19. Start-Up Characteristic
(V_{IN}=72V, V_{OUT}=12V, I_{OUT}=0.1A)

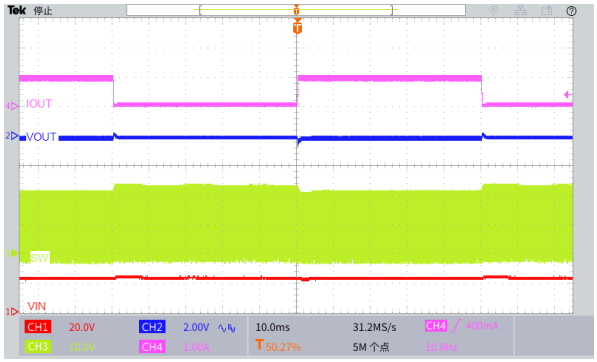


Figure 25. Load Transient Response
(V_{IN}=24V, V_{OUT}=12V, I_{OUT}=0.1 to 1.0A)

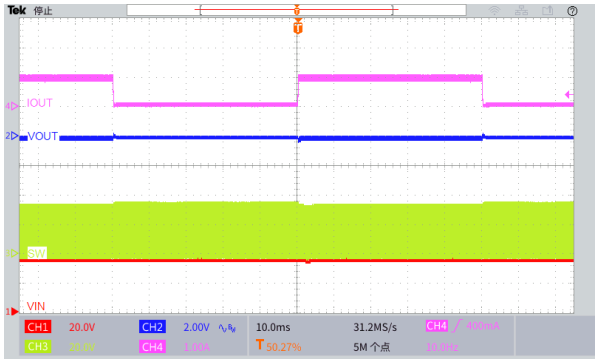


Figure 26. Load Transient Response
(V_{IN}=36V, V_{OUT}=12V, I_{OUT}=0.1 to 1.0A)

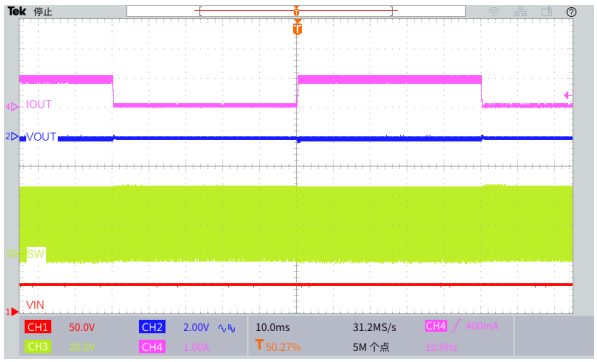


Figure 27. Load Transient Response
(V_{IN}=48V, V_{OUT}=12V, I_{OUT}=0.1 to 1.0A)

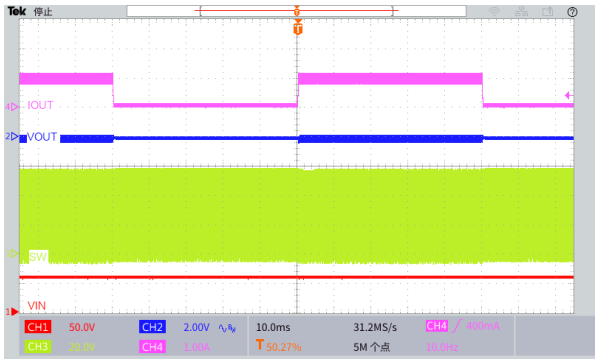


Figure 28. Load Transient Response
(V_{IN}=60V, V_{OUT}=12V, I_{OUT}=0.1 to 1.0A)

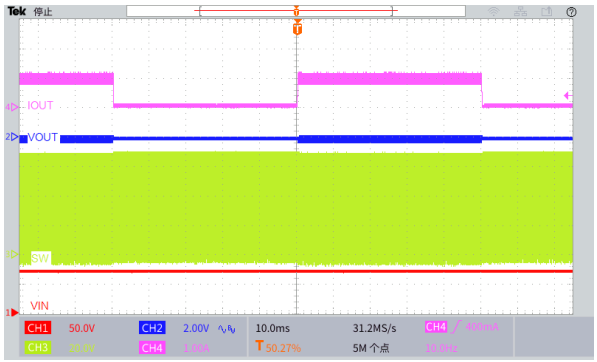
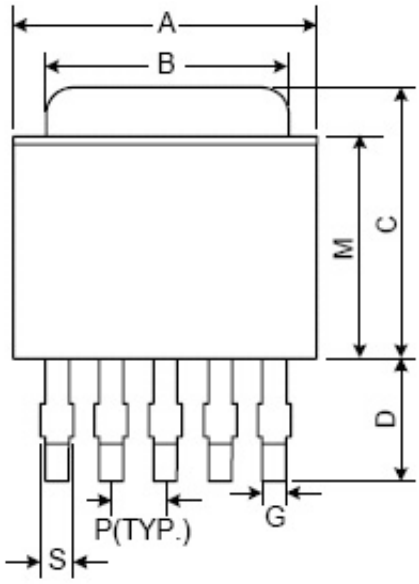
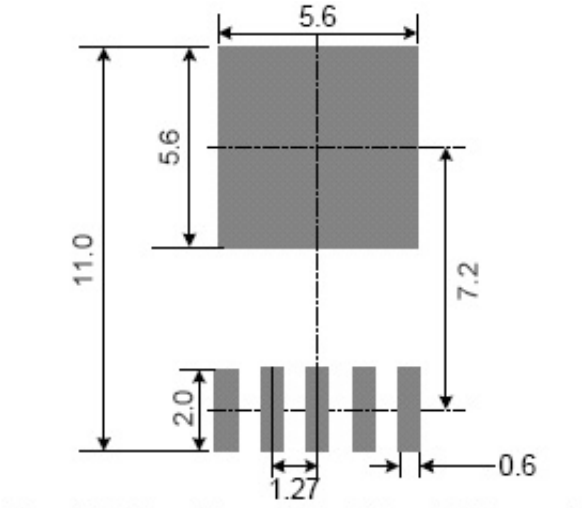


Figure 29. Load Transient Response
(V_{IN}=72V, V_{OUT}=12V, I_{OUT}=0.1 to 1.0A)

Package Information

TO252-5L





Land Pattern Recommendation (Unit: mm)

Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	6.35	6.60	6.85	0.250	0.260	0.270
B	5.20	5.35	5.50	0.205	0.211	0.217
C	6.80	7.00	7.30	0.268	0.276	0.287
D	2.40	2.80	3.20	0.094	0.110	0.126
P	1.27 REF			0.05 REF		
S	0.50	0.65	0.80	0.020	0.026	0.031
G	0.40	0.50	0.63	0.016	0.020	0.025
H	2.20	2.30	2.40	0.087	0.091	0.094
J	0.45	0.52	0.58	0.018	0.020	0.023
K	0.00	0.08	0.15	0.000	0.003	0.006
L	0.90	1.20	1.77	0.035	0.047	0.064
M	5.40	5.80	6.20	0.213	0.228	0.244

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