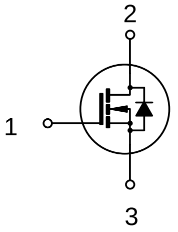
130A, 200V N-CHANNEL MOSFET

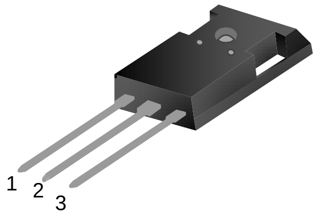
DESCRIPTION

SVTP209R7NP7 is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan's LVMOS technology. The improved process and cell structure have been especially tailored to minimize on-state resistance, provide superior switching performance and high avalanche breakdown tolerance.

This device is widely used in power management for UPS and Inverter Systems.



1. Gate 2. Drain 3.Source



TO-247-3L

FEATURES

- 130A, 200V, $R_{DS(on)(typ.)}$=8.5mΩ@V_{GS}=10V
- Low gate charge
- Low Crss
- Fast switching
- Extreme dv/dt rated
- 100% avalanche tested
- Pb-free lead plating
- RoHS compliant

KEY PERFORMANCE PARAMETERS

Characteristics	Ratings	Unit
V_{DS}	200	V
$V_{GS(th)}$	3.5~4.5	V
$R_{DS(on),max}$	9.7	mΩ
I_D	130	A
$Q_{g.typ.}$	185	nC

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVTP209R7NP7	TO-247-3L	P209R7NP7	Halogen free	Tube

ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED, T_J=25°C)

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Voltage	V_{DS}	--	200	--	--	V
Gate-source Voltage	V_{GS}	--	-20	--	20	V
Drain Current (Note 1)	I_D	T_C=25°C	--	--	130	A
		T_C=100°C	--	--	92	
Drain Current Pulsed (Note 2)	I_{DM}	T_C=25°C	--	--	520	A
Power Dissipation (Note 3)	P_D	T_C=25°C	--	--	469	W
Single Pulsed Avalanche Energy	E_{AS}	L=0.5mH, V_{DD}=100V, R_G=25Ω, starting temperature T_J=25°C	--	--	1225	mJ
Single Pulsed Current	I_{AS}	--	--	--	70	A
Operation Junction Temperature Range	T_J	--	-55	--	175	°C
Storage Temperature Range	T_{stg}	--	-55	--	175	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Thermal Resistance, Junction-case, Bottom	$R_{\theta JC}$	--	--	--	0.32	°C/W
Thermal Resistance, Junction-ambient	$R_{\theta JA}$	--	--	--	50	°C/W
Soldering Temperature (in line)	T_{sold}	15^{+2}_{-0} sec, 1time	--	--	260	°C

ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE NOTED, T_J=25°C)

Static characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	200	--	--	V
Drain-source Leakage Current	I_{DSS}	V_{DS}=200V, V_{GS}=0V, T_J=25°C	--	--	1.0	μA
		V_{DS}=200V, V_{GS}=0V, T_J=125°C	--	15	--	
Gate-source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	--	--	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250μA	3.5	--	4.5	V
Static Drain-source On State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=81A	--	8.5	9.7	mΩ
Gate Resistance	R_G	f=1MHz	--	1.4	--	Ω

Dynamic characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Input Capacitance	C_{iss}	f=1MHz, V_{GS}=0V, V_{DS}=50V	--	10544	--	pF
Output Capacitance	C_{oss}		--	793	--	
Reverse Transfer Capacitance	C_{rss}		--	307	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=130V, V_{GS}=10V, R_G=2.7Ω, I_D=81A (Notes 4, 5)	--	58	--	ns
Turn-on Rise Time	t_r		--	78	--	
Turn-off Delay Time	$t_{d(off)}$		--	95	--	
Turn-off Fall Time	t_f		--	58	--	
Total Gate Charge	Q_g	V_{DD}=100V, V_{GS}=10V, I_D=81A (Notes 4, 5)	--	185	--	nC
Gate-source Charge	Q_{gs}		--	82	--	
Gate-drain Charge	Q_{gd}		--	54	--	
Gate-plateau Voltage	$V_{plateau}$		--	6.8	--	V

Reverse diode characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Continuous Diode Forward Current	I_S	Integral reverse P-N junction diode in the MOSFET	--	--	130	A
Diode Pulse Current	$I_{S,pulse}$		--	--	520	
Diode Forward Voltage	V_{SD}	I_S=81A, V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=81A, V_{GS}=0V, V_R=100V dI_F/dt=100A/µs (Note 4)	--	126	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.79	--	nC

Notes:

1. The rated value only refers to the maximum absolute value at the case temperature of 25°C in the specification. If the case temperature is higher than 25°C, it should be derated according to the actual environmental conditions;
2. Pulse time 5µs, pulse width is limited by the maximum junction temperature;
3. The dissipation power will change with temperature, derating above 25°C: 3.13W/°C;
4. Pulse Test: Pulse width ≤300µs, Duty cycle≤2%;
5. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

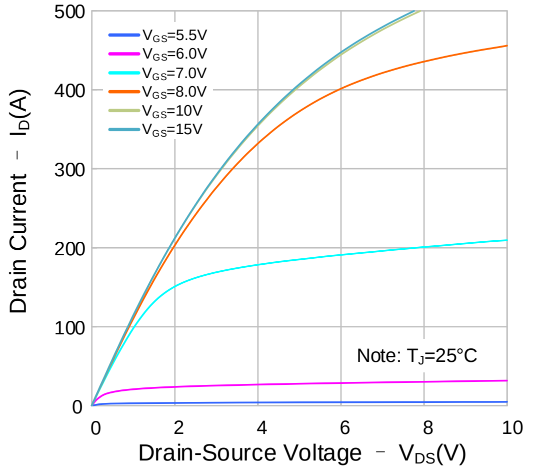


Figure 2. Transfer Characteristics

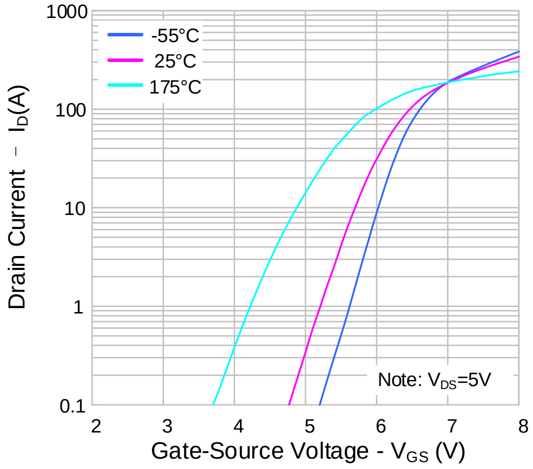


Figure 3. On-resistance vs. Drain Current

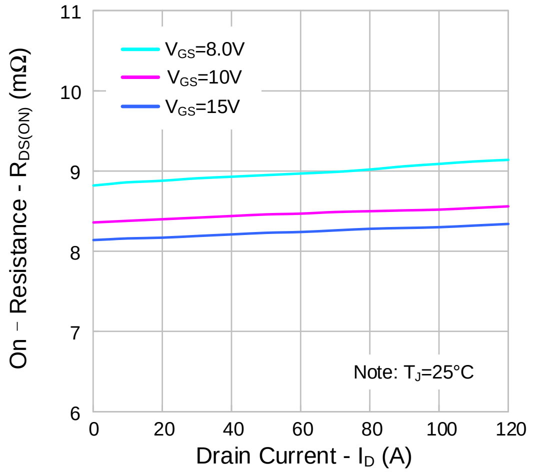


Figure 4. On-resistance vs. Gate-Source Voltage

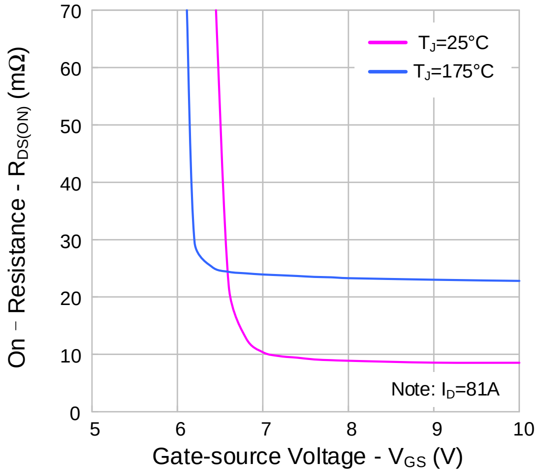


Figure 5. Turn-on Voltage vs.
Temperature Characteristics

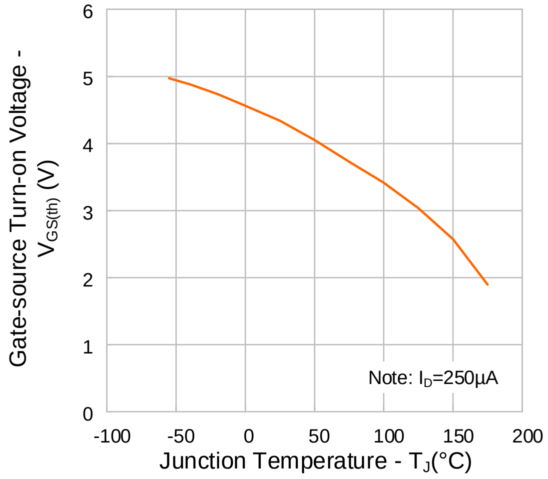
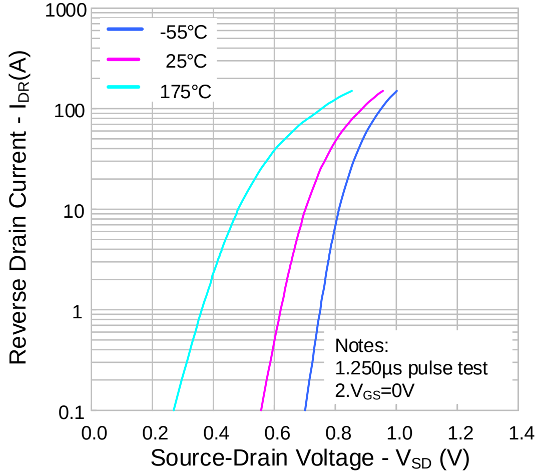


Figure 6. Body Diode Forward Voltage
Variation vs. Source Current and Temperature



TYPICAL CHARACTERISTICS (CONTINUED)

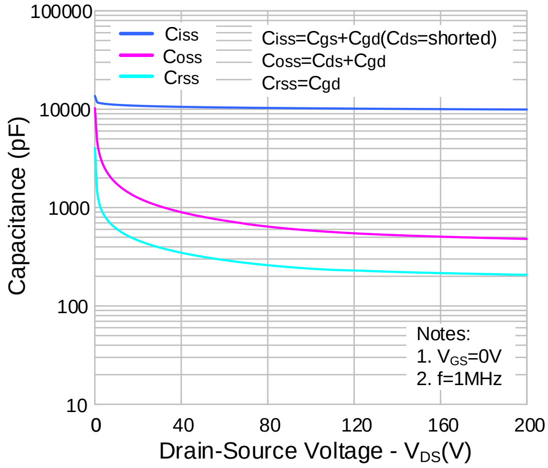


Figure 7. Capacitance Characteristics

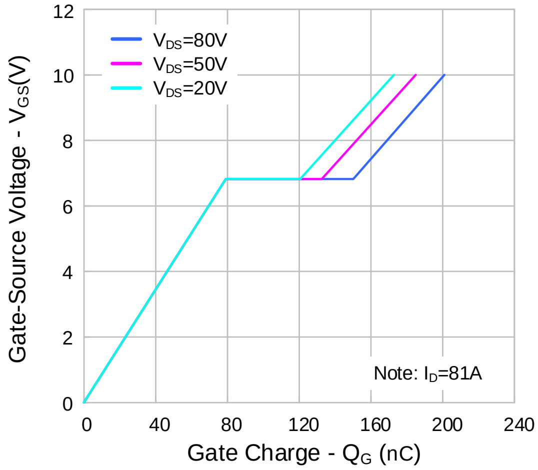


Figure 8. Gate Charge

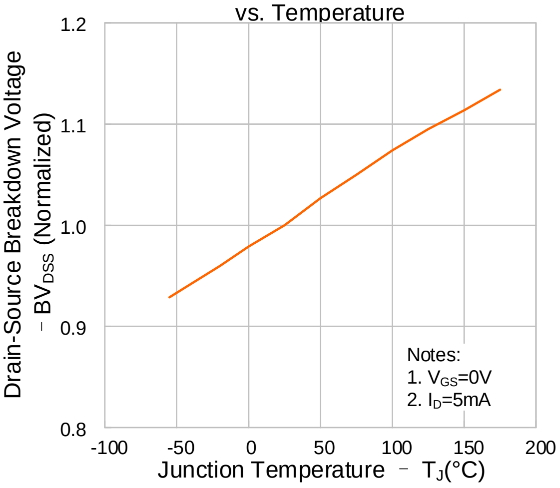


Figure 9. Breakdown Voltage Variation vs. Temperature

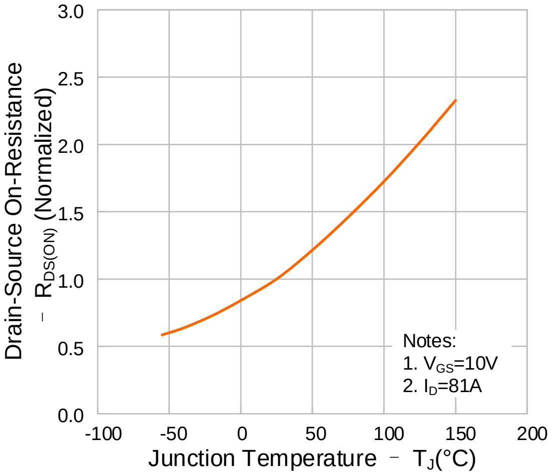


Figure 10. On-resistance Variation vs. Temperature

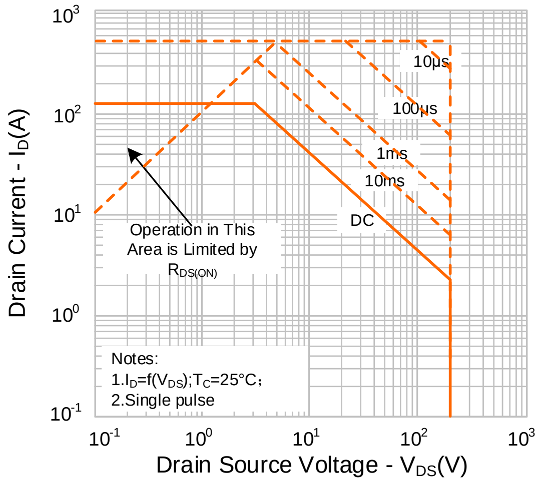


Figure 11. Max. Safe Operating Area

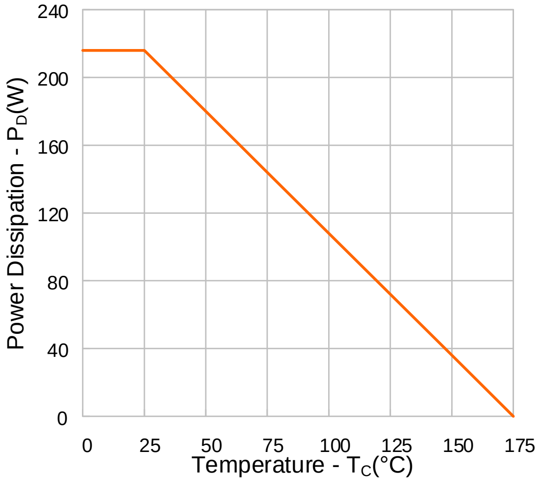


Figure 12. Power Dissipation vs. Case Temperature

TYPICAL CHARACTERISTICS (CONTINUED)

Figure 13. Drain Current vs. Case Temperature

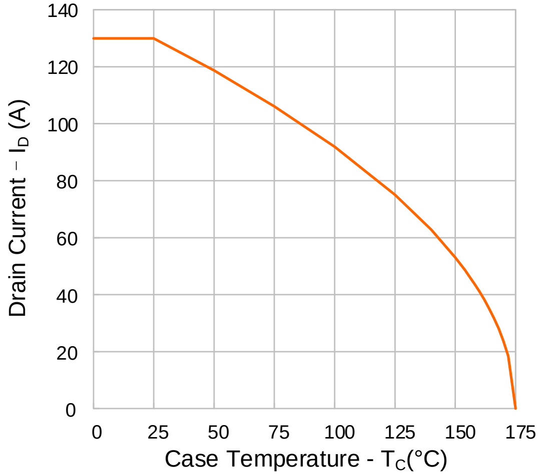
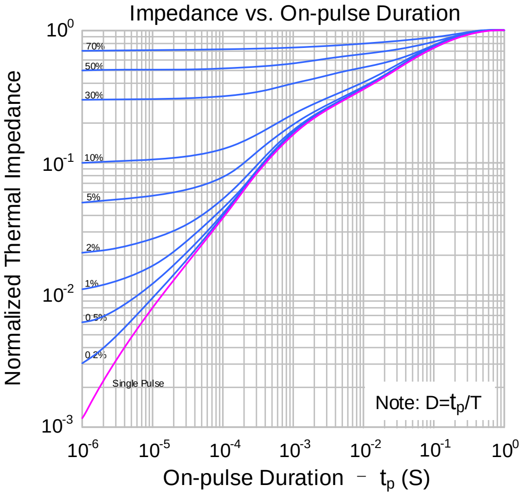
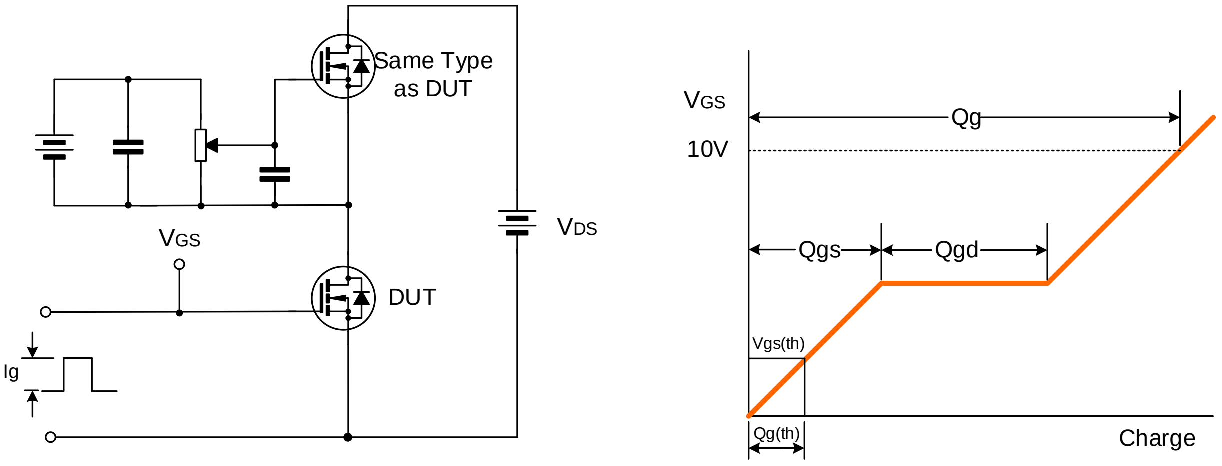


Figure 14. Transient Thermal Impedance vs. On-pulse Duration

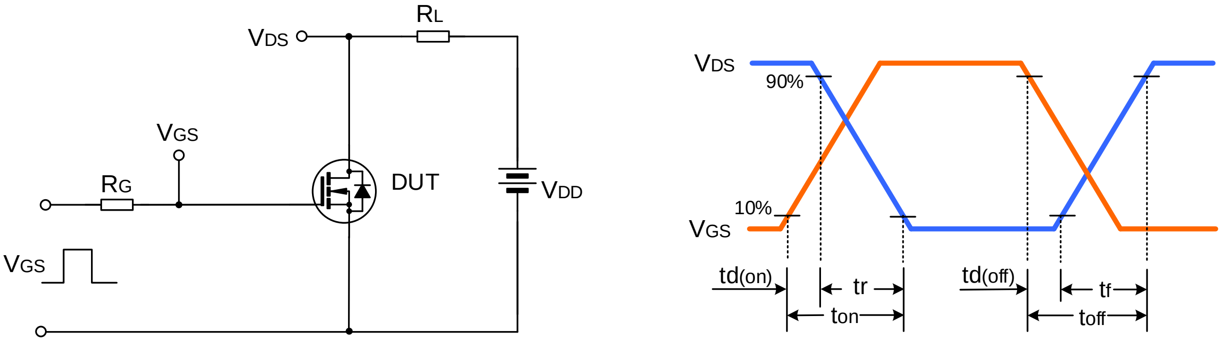


TYPICAL TEST CIRCUIT

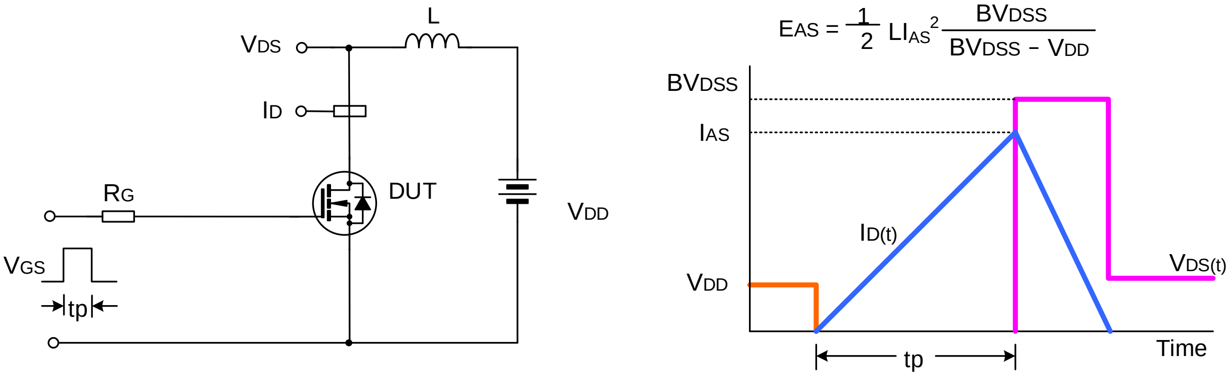
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

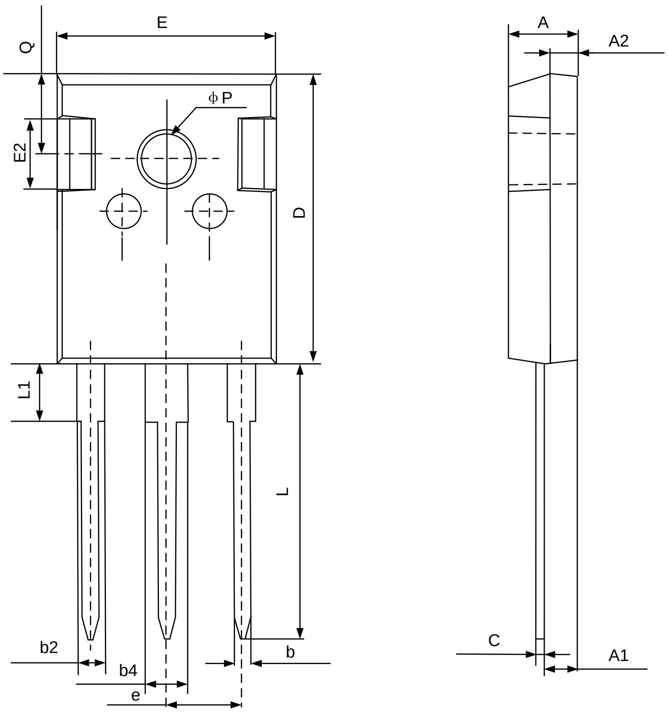


Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-247-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	–	1.36
b2	1.91	–	2.25
b4	2.91	–	3.25
c	0.51	–	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e	5.44 BSC		
L	19.72	19.92	20.22
L1	–	–	4.30
Q	5.60	5.80	6.00
P	3.40	—	3.80

Important notice:

1. **The instructions are subject to change without notice!**
2. **Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current. Please read the instructions carefully before using our products, including the circuit operation precautions.**
3. **Our products are consumer electronic products or the other civil electronic products.**
4. **When using our products, please do not exceed the maximum rating of the products, otherwise the reliability of the whole machine will be affected. There is a certain possibility of failure or malfunction of any semiconductor product under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design, sample and whole machine manufacturing, so as to avoid potential failure risk that may cause personal injury or property loss.**
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Rev.: 1.0

Revision History:

1. First release