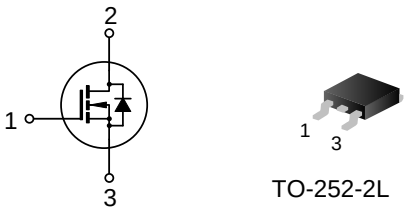
60A, 60V N-CHANNEL MOSFET

DESCRIPTION

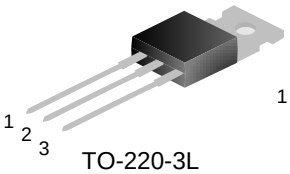
SVG069R5ND(MJ)(T) is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan's LVMOS technology. The improved process and cell structure have been especially tailored to minimize on-state resistance, provide superior switching performance.

This device is widely used in Secondary synchronous rectifier, Power Management for Inverter Systems.

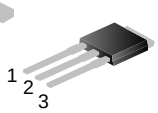


1.Gate 2.Drain 3.Source

TO-252-2L



TO-220-3L



TO-251J-3L

FEATURES

- 60A, 60V, $R_{DS(on)(typ.)}$=8mΩ@V_{GS}=10V
- Low gate charge
- Low Crss
- Fast switching
- Improved dv/dt capability

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVG069R5NDTR	TO-252-2L	069R5ND	Halogen free	Tape&Reel
SVG069R5NMJ	TO-251J-3L	069R5NMJ	Halogen free	Tube
SVG069R5NT	TO-220-3L	069R5NT	Halogen free	Tube

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

Characteristics		Symbol	Ratings		Unit
			SVG069R5ND/MJ	SVG069R5NT	
Drain-Source Voltage		V_{DS}	60		V
Gate-Source Voltage		V_{GS}	±20		V
Drain Current	T_C=25°C	I_D	60		A
	T_C=100°C		38		
Drain Current Pulsed		I_{DM}	240		A
Power Dissipation(T_C=25°C)		P_D	63	125	W
-Derate above 25°C			0.5	1.0	W/°C
Single Pulsed Avalanche Energy(Note 1)		E_{AS}	81		mJ
Operation Junction Temperature Range		T_J	-55～+150		°C
Storage Temperature Range		T_{stg}	-55～+150		°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings		Unit
		SVG069R5ND/MJ	SVG069R5NT	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.0	1.0	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	62.5	°C/W

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	60	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	--	--	1.0	μA
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	1.0	--	3.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=13.5A	--	8	9.5	mΩ
		V_{GS}=4.5V, I_D=11.5A	--	11	14	mΩ
Gate Resistance	R_G	f=1MHz	--	1.8	--	Ω
Input Capacitance	C_{iss}	f=1MHz,V_{GS}=0V, V_{DS}=30V	--	1061	--	pF
Output Capacitance	C_{oss}		--	432	--	
Reverse Transfer Capacitance	C_{rss}		--	23	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V, V_{GS}=10V, R_G=3Ω, I_D=13.5A (Note 2,3)	--	8.0	--	ns
Turn-on Rise Time	t_r		--	54	--	
Turn-off Delay Time	$t_{d(off)}$		--	19	--	
Turn-off Fall Time	t_f		--	8.8	--	
Total Gate Charge	Q_g	V_{DD}=48V, V_{GS}=10V, I_D=13.5A (Note 2,3)	--	17	--	nC
Gate-Source Charge	Q_{gs}		--	5.8	--	
Gate-Drain Charge	Q_{gd}		--	2.6	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction	--	--	60	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	240	
Diode Forward Voltage	V_{SD}	I_S=13.5A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=13.5A,V_{GS}=0V,	--	52	--	ns
Reverse Recovery Charge	Q_{rr}	dIF/dt=100A/μs(Note 2)	--	0.05	--	μC

Notes:

1.L=0.5mH, V_{DD}=50V, R_G=10Ω,starting T_J=25°C;

2.Pulse Test: Pulse width ≤300μs,Duty cycle≤2%;

3.Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. Output Characteristics

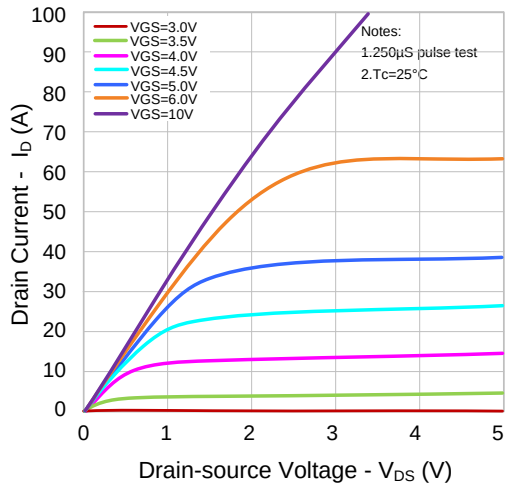


Figure 2. Transfer Characteristics

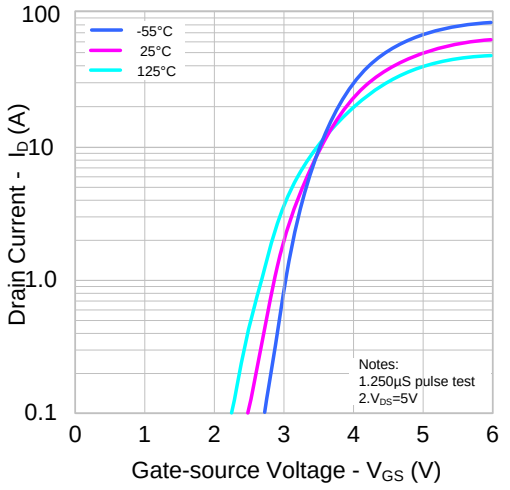


Figure 3. On-resistance vs. Drain Current

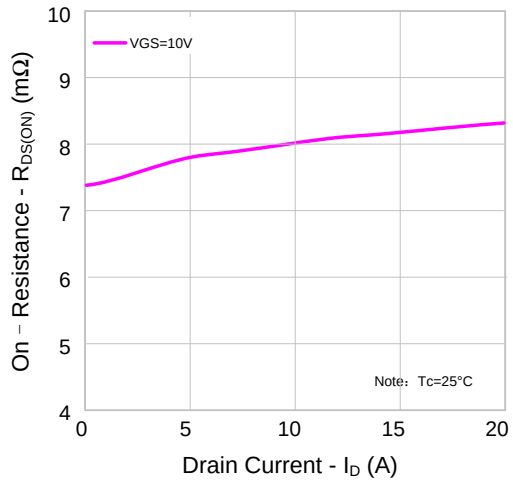


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

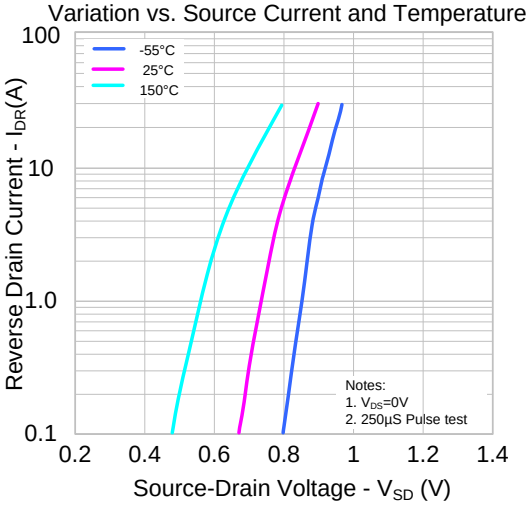


Figure 5. Capacitance Characteristics

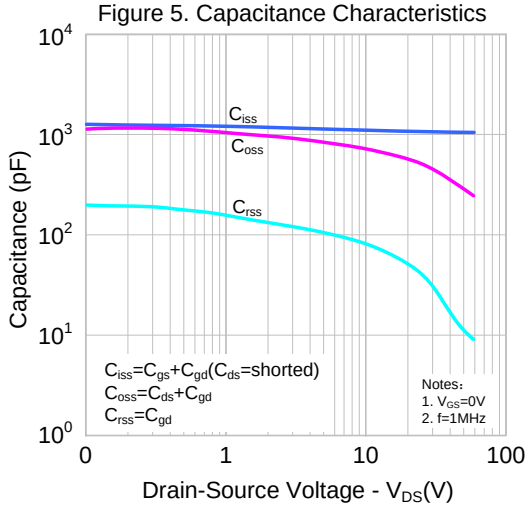
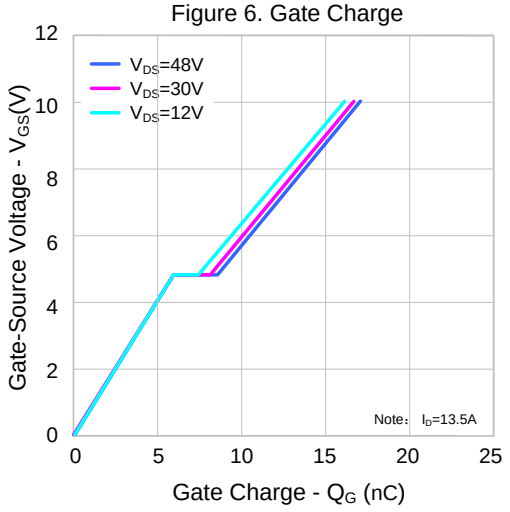


Figure 6. Gate Charge



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 7. Breakdown Voltage vs. Temperature Characteristics

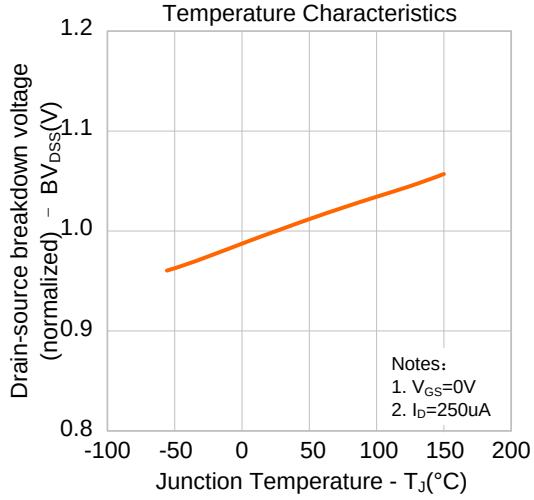


Figure 8. On-resistance vs. Temperature Characteristics

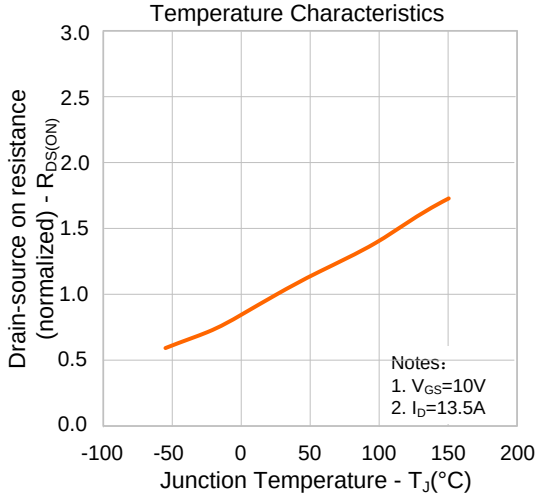


Figure 9-1. Max. Safe Operating Area(SVG069R5ND/MJ)

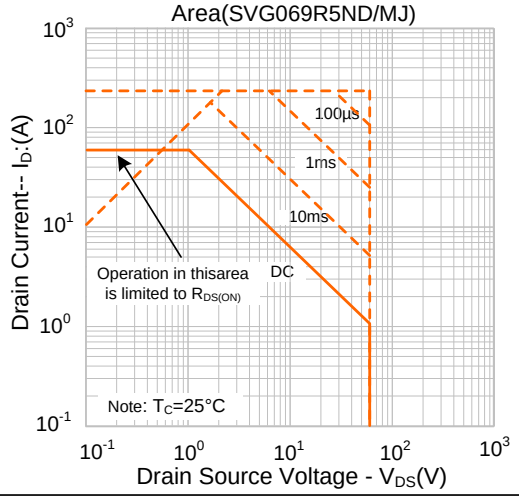
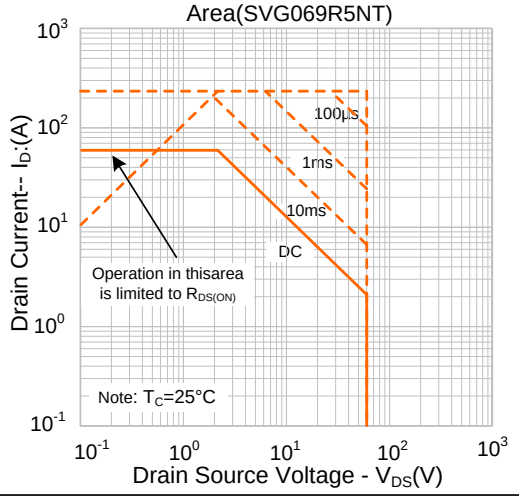
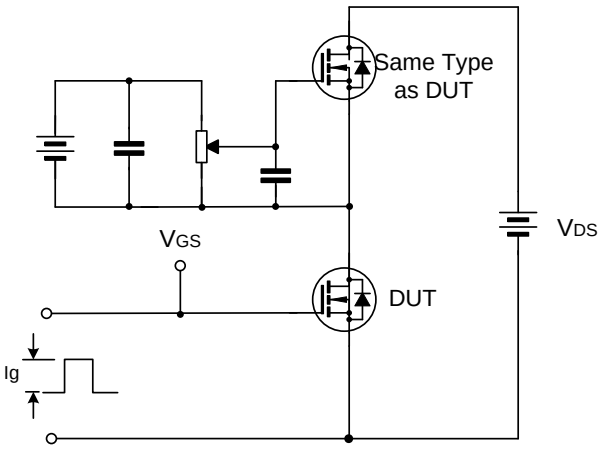


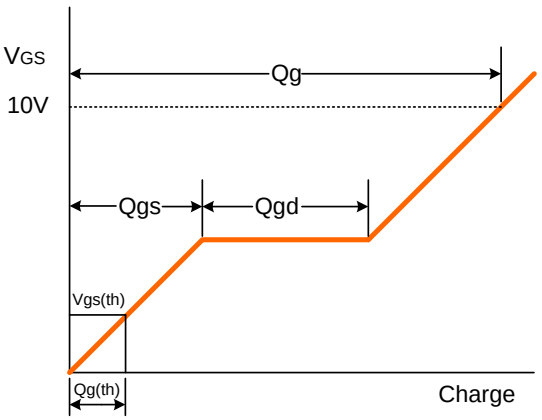
Figure 9-2. Max. Safe Operating Area(SVG069R5NT)



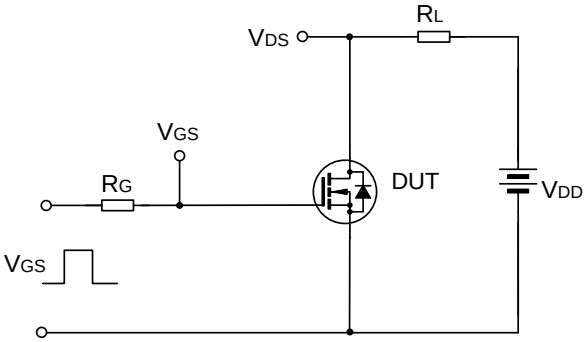
TYPICAL TEST CIRCUIT

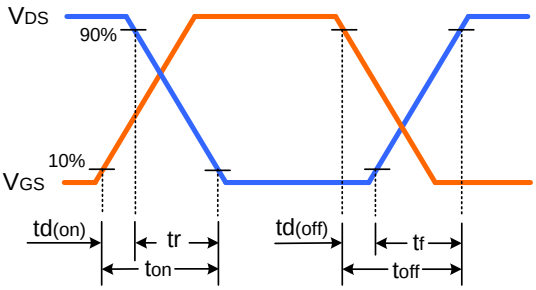
Gate Charge Test Circuit & Waveform



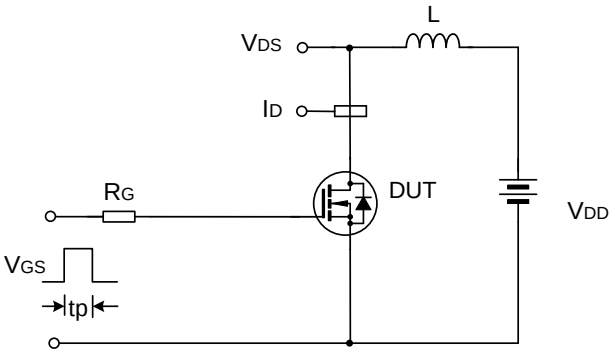


Resistive Switching Test Circuit & Waveform

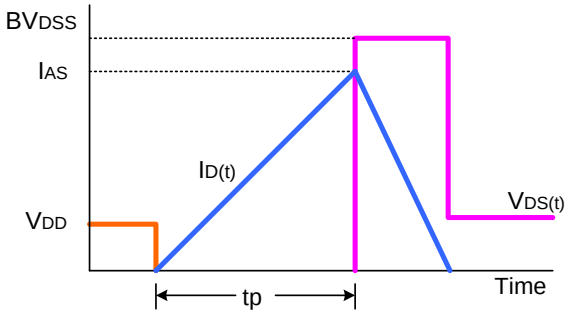




Unclamped Inductive Switching Test Circuit & Waveform



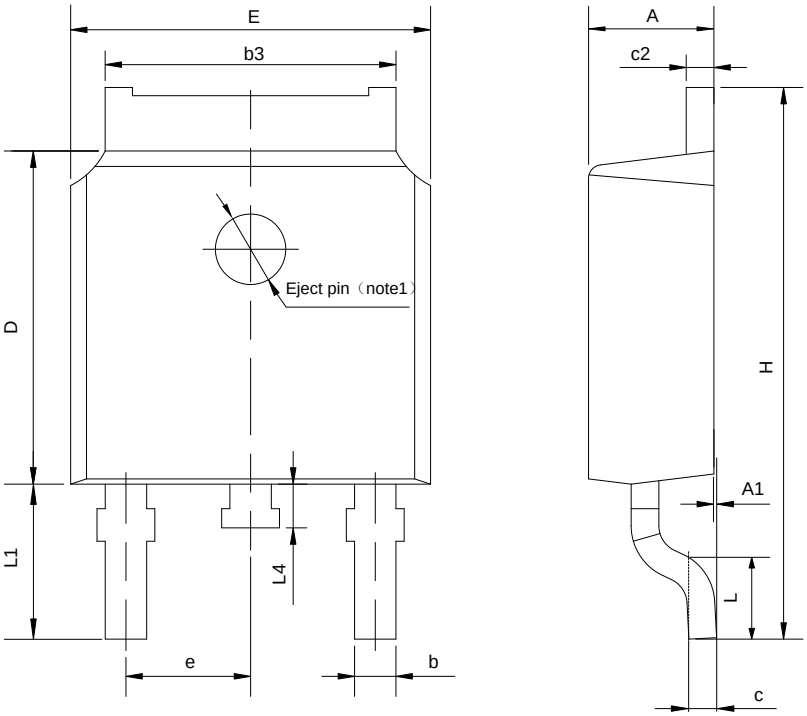
$$E_{AS} = \frac{1}{2} LI_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



PACKAGE OUTLINE

TO-252-2L

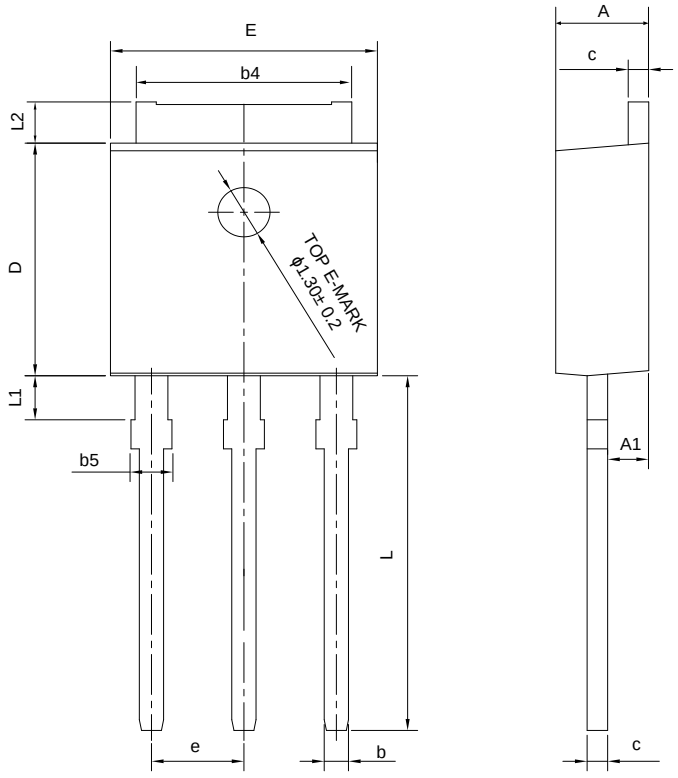
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	—	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	—	0.65
c2	0.45	—	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

TO-251J-3L

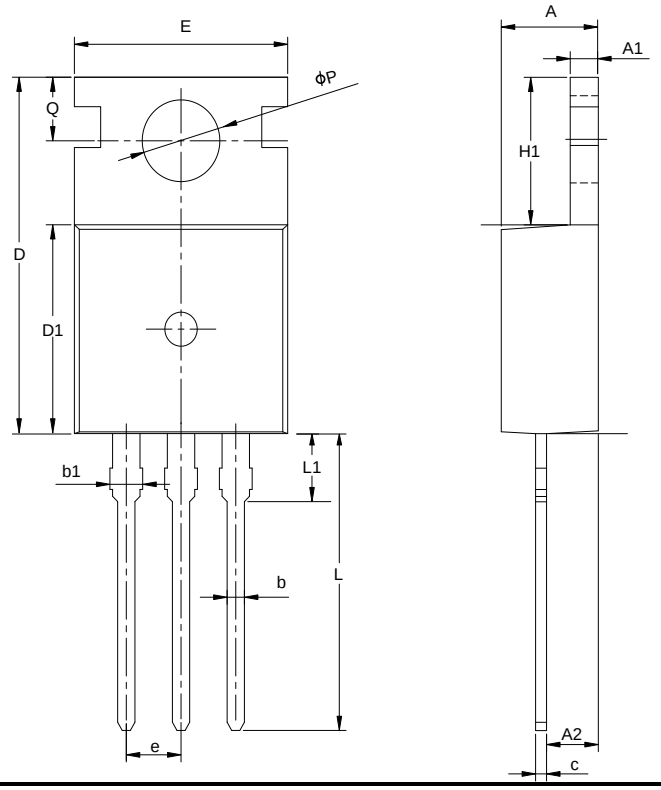
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.18	2.30	2.39
A1	0.89	1.00	1.14
b	0.56	—	0.89
b4	4.95	5.33	5.46
b5	—	—	1.05
c	0.46	—	0.61
D	5.97	6.10	6.27
E	6.35	6.60	6.73
e	2.29 BCS		
L	8.89	9.30	9.65
L1	0.95	—	1.50
L2	0.89	—	1.27

PACKAGE OUTLINE

TO-220-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	1.00	1.30	1.50
A2	1.80	2.40	2.80
b	0.60	0.80	1.00
b1	1.00	—	1.60
c	0.30	—	0.70
D	15.10	15.70	16.10
D1	8.10	9.20	10.00
E	9.60	9.90	10.40
e	2.54BSC		
H1	6.10	6.50	7.00
L	12.60	13.08	13.60
L1	—	—	3.95
ϕP	3.40	3.70	3.90
Q	2.60	—	3.20

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Rev.: 1.2

Revision History:

1. Add RDSON of VGS=4.5V
2. Update the template of the datasheet

Rev.: 1.1

Revision History:

1. Add TO-220-3L

Rev.: 1.0

Revision History:

1. First release