

60V, 140A N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

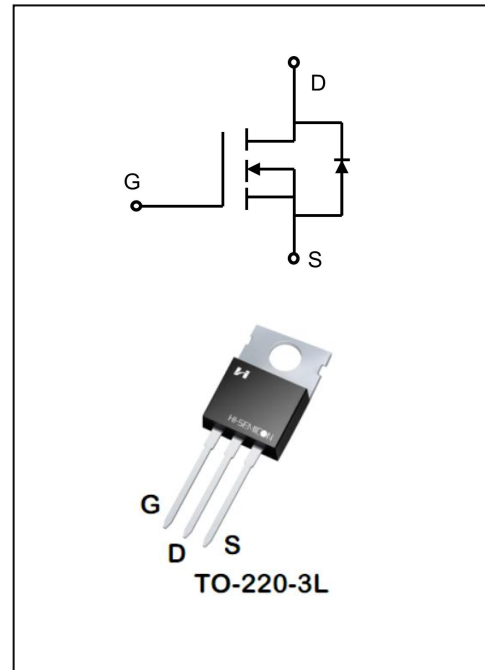
The SGP063R5T uses advanced SGT technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

Features

- ◆ $V_{DS}=60V$, $I_D=140A$
- ◆ $R_{DS(on)}$
TYP: $2.8m\Omega$ @ $V_{GS}=10V$

Applications

- ◆ Motor driver
- ◆ Load switching



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SGP063R5T	TO-220-3L	SGP063R5T	Pb Free	Tube

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	
Drain Current	I_D	$T_C = 25^{\circ}\text{C}$ 140	A
		$T_C = 100^{\circ}\text{C}$ 98	
Drain Current Pulsed(Note 1)	I_{DM}	560	
Power Dissipation($T_C=25^{\circ}\text{C}$)	P_D	104	W
Single Pulsed Avalanche Energy (Note 2)	E_{AS}	366	mJ
Operation Junction Temperature Range	T_J	$-55\sim+150$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$-55\sim+150$	
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300	

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.2	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	56	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDSS}	V _{GS} =0V, I _D =250μA	60	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	--	--	1.0	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-20V, V _{DS} =0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	2.0	3.0	4.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A	--	2.8	3.5	mΩ
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V, f=1.0MHZ	--	2.5	--	Ω
Input Capacitance	C _{iSS}	V _{DS} =30V V _{GS} =0V f=1.0MHZ	--	2721	--	pF
Output Capacitance	C _{oSS}		--	1099	--	
Reverse Transfer Capacitance	C _{rSS}		--	50	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V V _{DS} =10V R _G =3Ω	--	7.3	--	ns
Turn-on Rise Time	t _r		--	11	--	
Turn-off Delay Time	t _{d(off)}		--	24	--	
Turn-off Fall Time	t _f		--	11	--	

Total Gate Charge	Q_g	$V_{DS}=30V, I_D=20A$ $V_{GS}=10V$ (Note 3.4)	--	45	--	nC
Gate-Source Charge	Q_{gs}		--	11.8	--	
Gate-Drain Charge	Q_{gd}		--	11.5	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	140	A
Pulsed Source Current	I_{SM}		--	--	560	
Diode Forward Voltage	V_{SD}	$I_S=30A, V_{GS}=0V$	--	0.8	1.2	V
Reverse Recovery Time	T_{rr}	$I_F=20A, V_R=10V,$ $dI_F/dt=100A/\mu S$	--	44	--	ns
Reverse Recovery Charge	Q_{rr}		--	56	--	nC

1. Pulse width limited by maximum junction temperature

2. $L=0.5mH, V_{DD}=30V, R_G=25\Omega$, starting $T_J=25^\circ C$

3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

4. Essentially independent of operating temperature

Typical Performance Characteristics

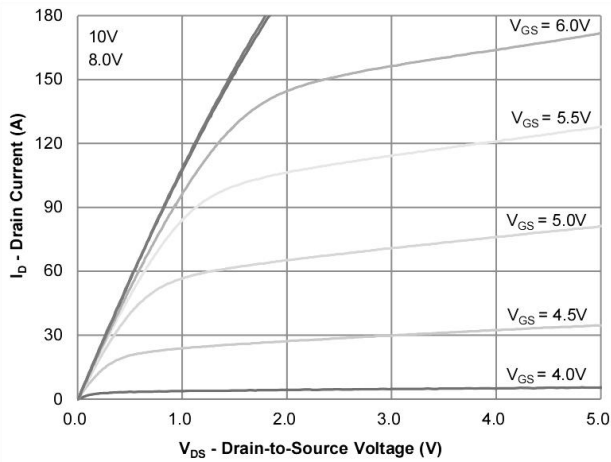


Figure 1: Output Characteristics

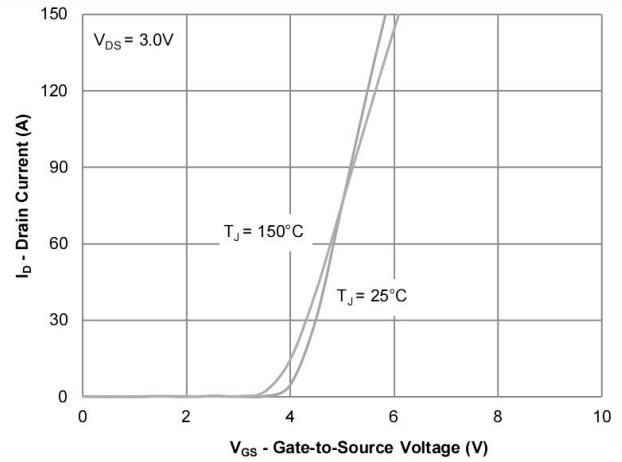


Figure 2: Transfer Characteristics

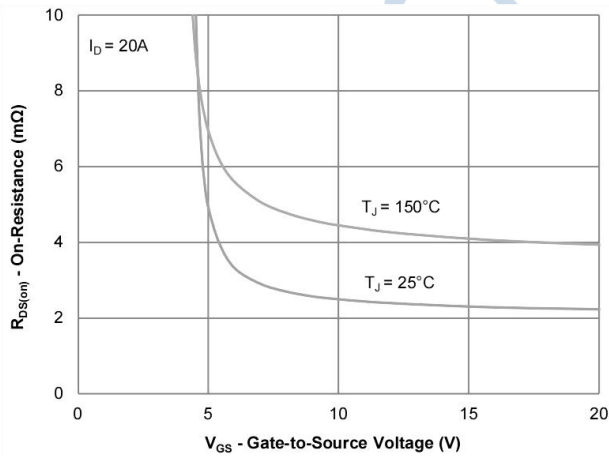


Figure 3: On-Resistance vs. Gate-Source Voltage

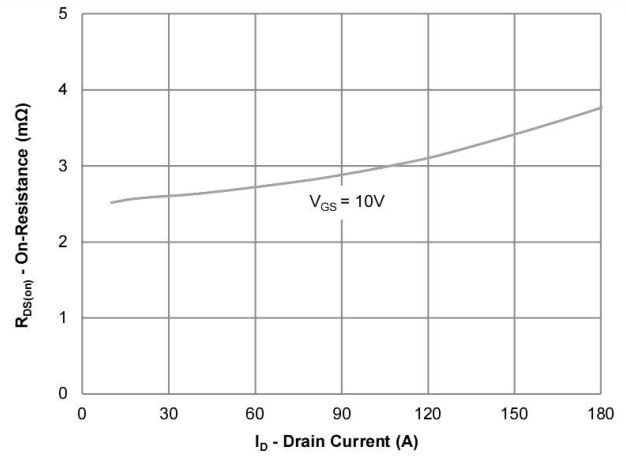


Figure 4: On-Resistance vs. Drain Current

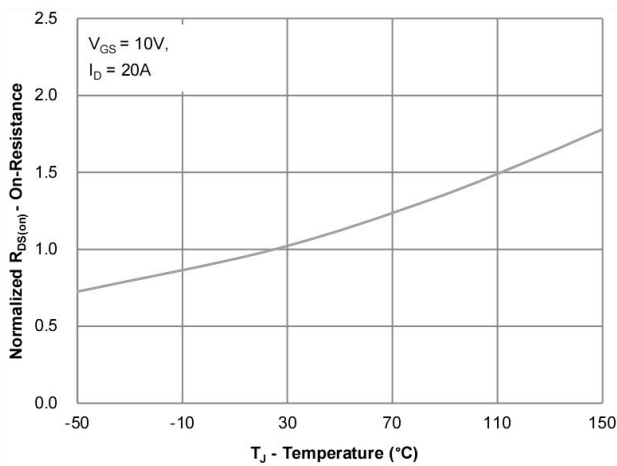


Figure 5: On-Resistance vs. Junction Temperature

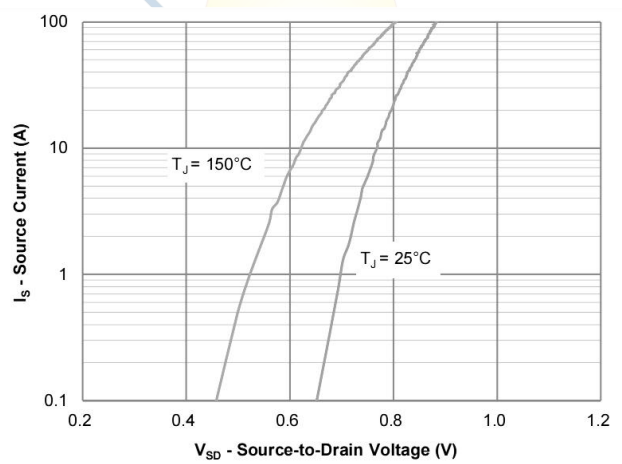


Figure 6: Source-Drain Diode Forward Voltage

Typical Performance Characteristics

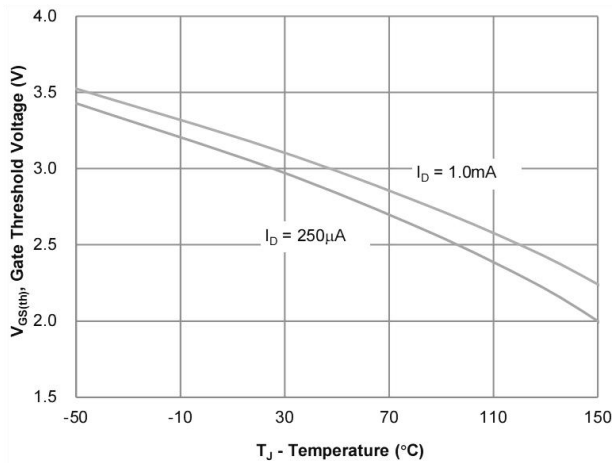


Figure 7: Gate Threshold Variation vs. Junction Temperature

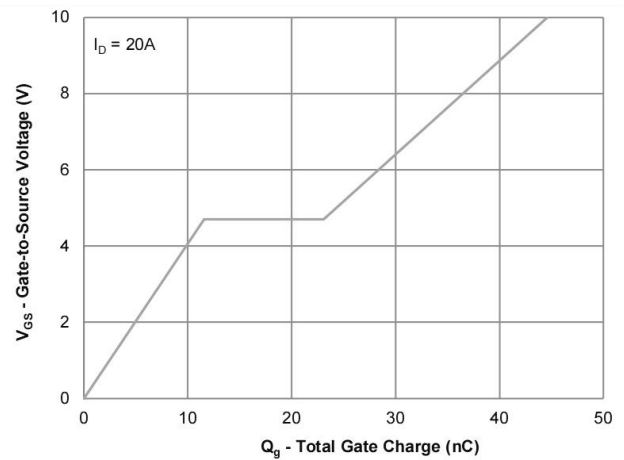


Figure 8: Gate Charge Characteristics

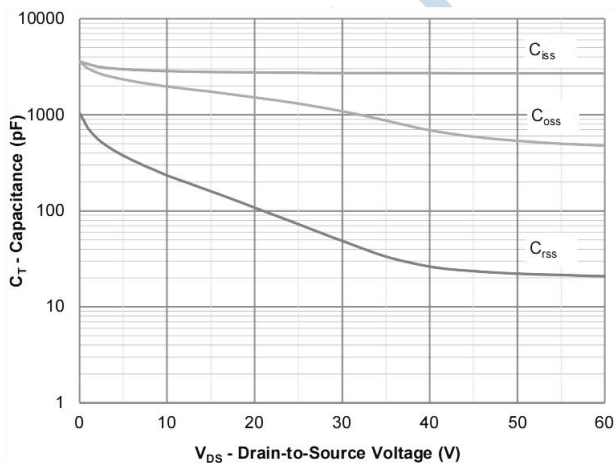


Figure 9: Capacitance Characteristics

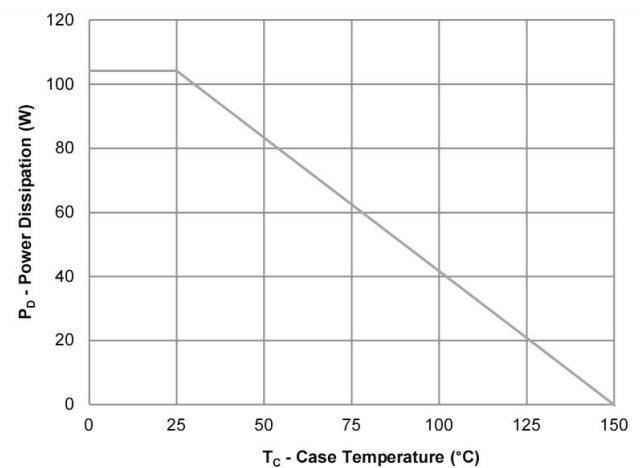


Figure 10: Power Derating

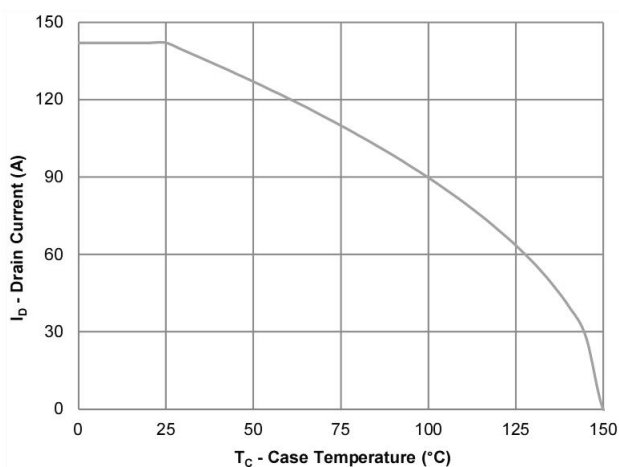


Figure 11: Current Derating

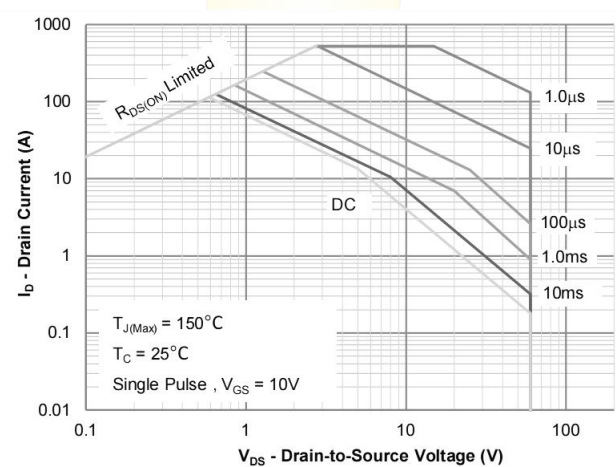
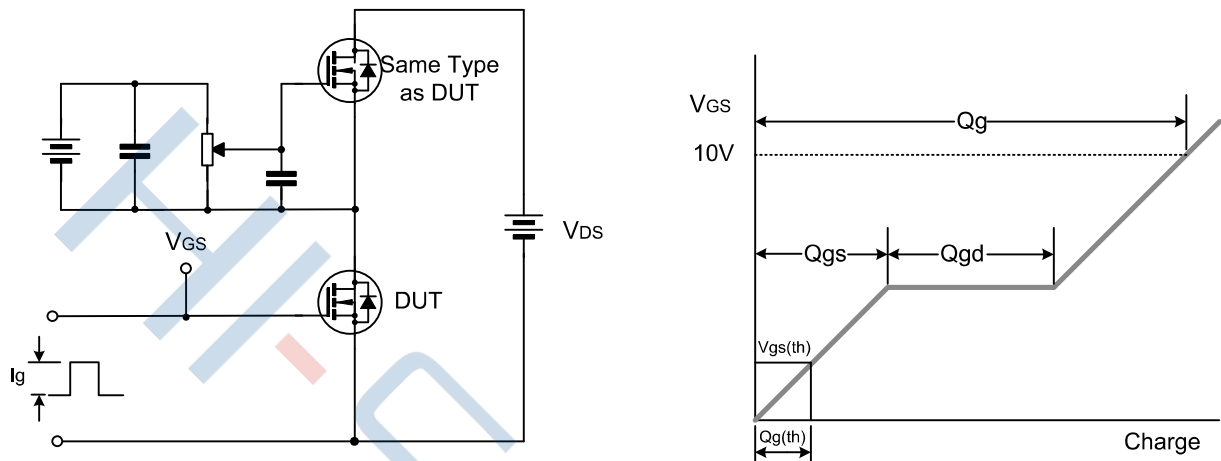


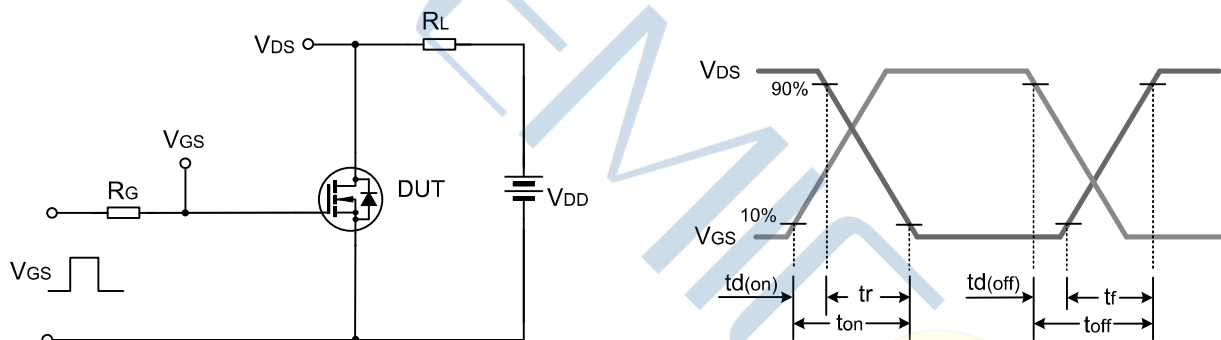
Figure 12: Safe Operating Area

Test Circuit

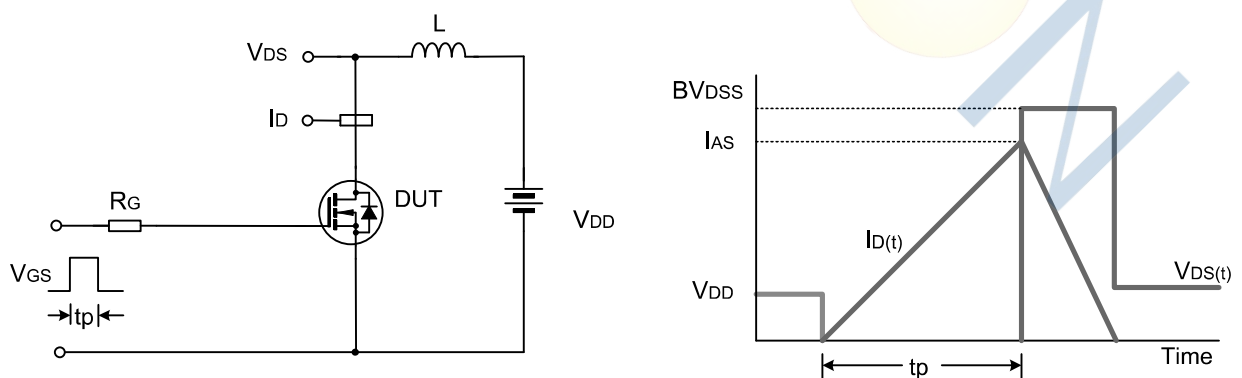
Gate Charge Test Circuit & Waveform



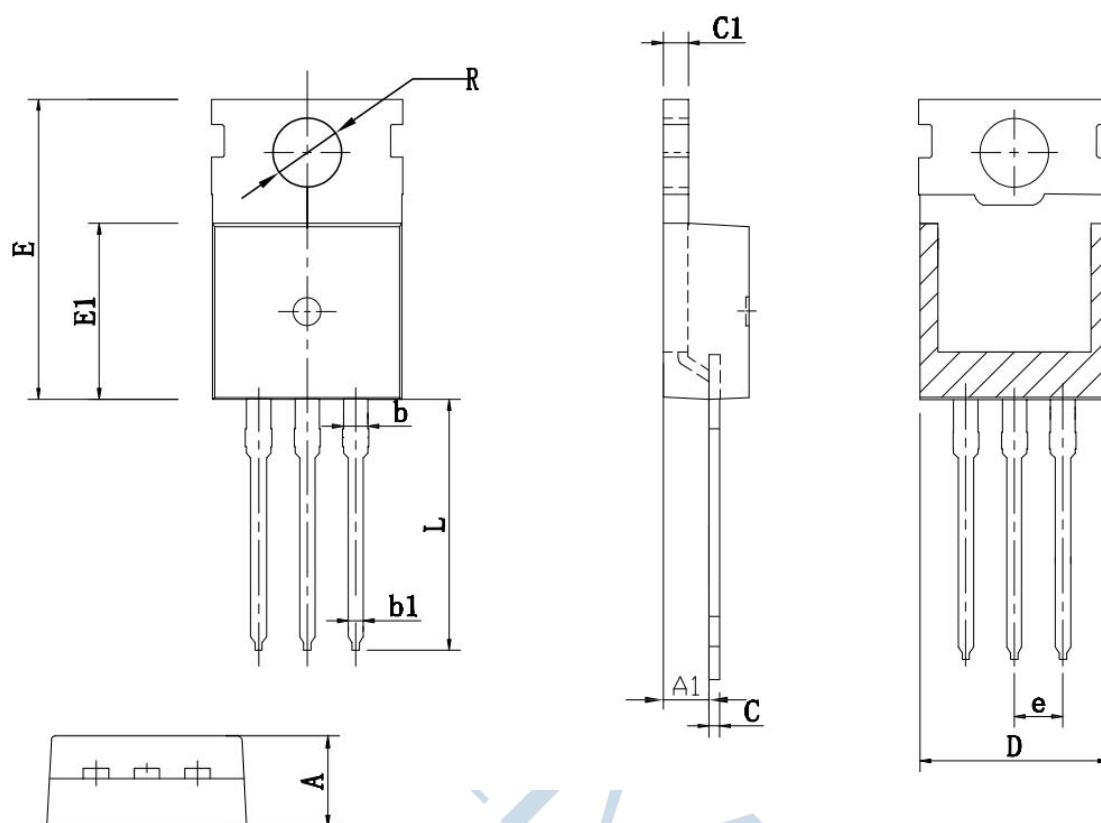
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of TO-220-3L



Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	4.30	4.50	4.70
b	1.20	1.28	1.36
b1	0.70	0.80	0.90
C	0.40	0.50	0.60
C1	1.20	1.30	1.40
D	9.80	10.00	10.20
A1	2.00	2.50	3.00
E	15.20	15.45	15.75
E1	9.00	9.20	9.40
e	2.34	2.54	2.74
L	12.60	13.10	13.60
R	3.50	3.60	3.70

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