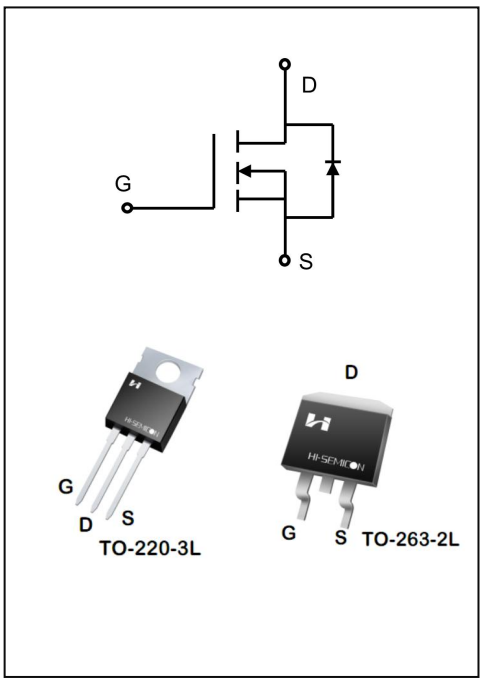
100V, 120A N-CHANNEL POWER MOSFET



GENERAL DESCRIPTION

The SGX105R5T 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}=100V, I_D=120A
- ◆$R_{DS(on)}$
  TYP: 5.1mΩ @V_{GS}=10V

Applications

- ◆Power faction correction (PFC)
- ◆Switched mode power supplies (SMPS)
- ◆Uninterruptible power supply (UPS)
- ◆LED lighting power

ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SGP105R5T	TO-220-3L	SGP105R5T	Pb Free	Tube
SGA105R5T	TO-263-2L	SGA105R5T	Pb Free	Reel

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	
Drain Current	T_C = 25°C	I_D	120	A
	T_C = 100°C		90	
Drain Current Pulsed(Note 1)		I_{DM}	480	
Power Dissipation(T_C=25°C) -Derate above 25°C		P_D	160	W
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	763	mJ
Operation Junction Temperature Range		T_J	-55～+150	°C
Storage Temperature Range		T_{stg}	-55～+150	
Maximum lead temperature for soldering purposes,1/8" from case for 5 seconds		TL	300	

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.78	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°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	100	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=100V, V_{GS}=0V	--	--	1	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=50A	--	5.1	5.5	mΩ
Dynamic Characteristics						
Gate Resistance	Rg	V_{GS}=0V, f=1.0MHZ	1	4.2	10	Ω
Input Capacitance	C_{iss}	V_{DS}=50V	--	3880	--	pF
Output Capacitance	C_{oss}	V_{GS}=0V	--	525	--	
Reverse Transfer Capacitance	C_{rss}	f=1.0MHZ	--	14	--	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=40V	--	51.2	--	ns
Turn-on Rise Time	t_r	V_{DS}=10V	--	77.3	--	
Turn-off Delay Time	$t_{d(off)}$	R_G=24Ω, I_D=30A	--	155.6	--	
Turn-off Fall Time	t_f	(Note 3.4)	--	92.1	--	

Total Gate Charge	Q_g	V_{DS}=40V, I_D=30A	--	65.1	--	nC
Gate-Source Charge	Q_{gs}	V_{GS}=10V	--	24.3	--	
Gate-Drain Charge	Q_{gd}	(Note 3.4)	--	16.1	--	

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	--	--	120	A
Pulsed Source Current	I_{SM}		--	--	480	
Diode Forward Voltage	V_{SD}	I_S=30A,V_{GS}=0V	--	0.8	1.2	V
Reverse Recovery Time	T_{rr}	I_F=30A,V_R=10V, dIF/dt=100A/μS	--	71	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.14	--	uC

1.Pluse width limited by maximum junction temperature

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

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

4.Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. Output Characteristics

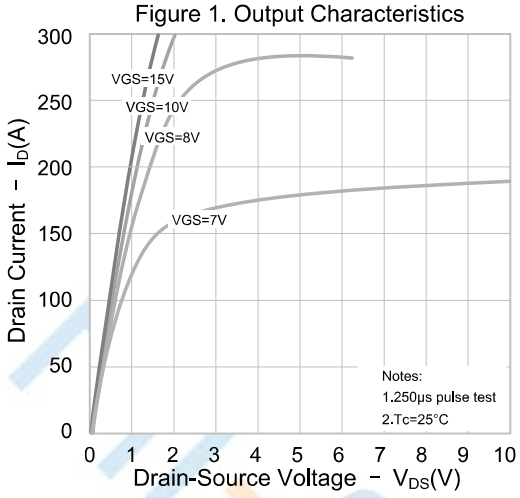


Figure 2. Transfer Characteristics

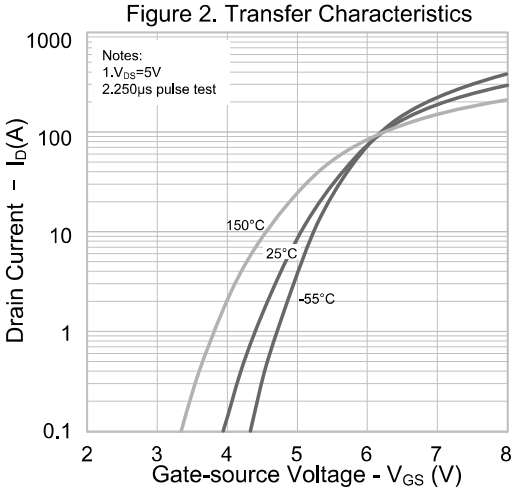


Figure 3. On-resistance vs. Drain Current

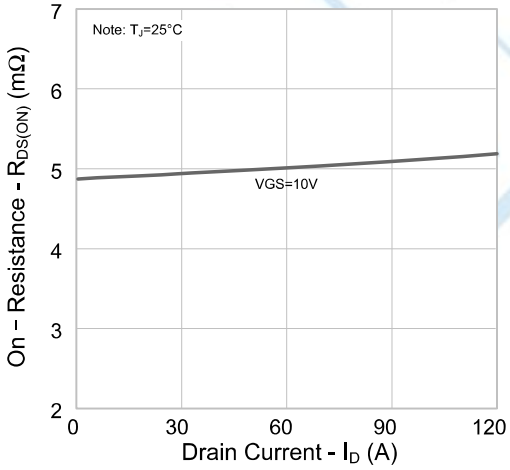


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

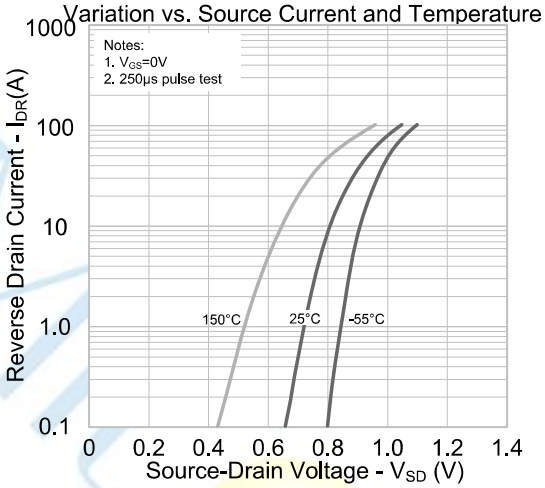


Figure 5. Capacitance Characteristics

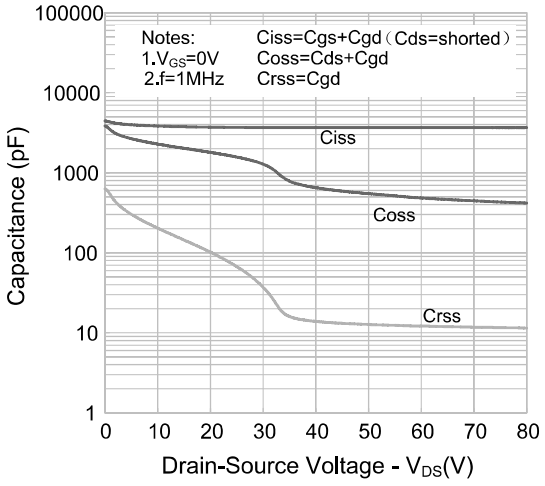
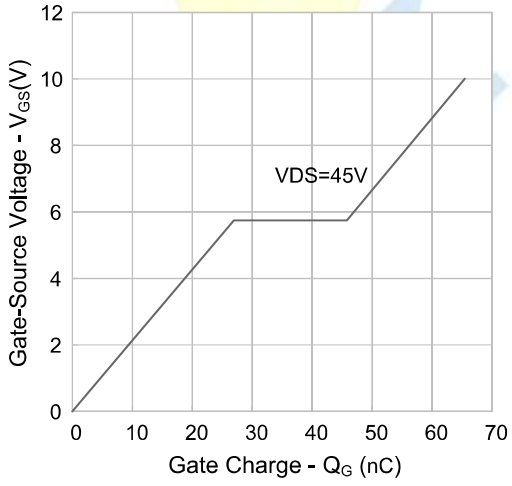


Figure 6. Gate Charge



Typical Performance Characteristics

Figure 7. Breakdown Voltage Variation vs. Temperature

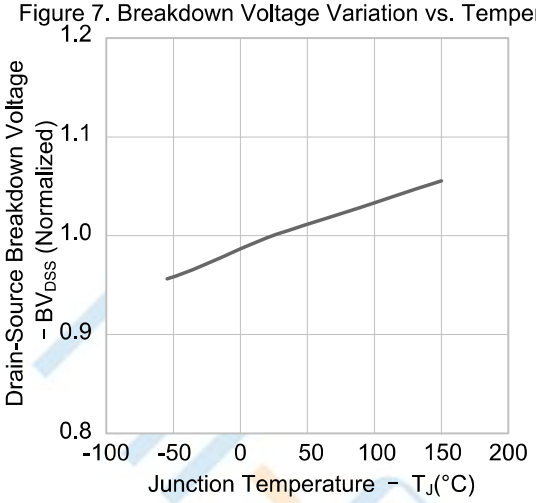


Figure 8. On-resistance Variation vs. Temperature

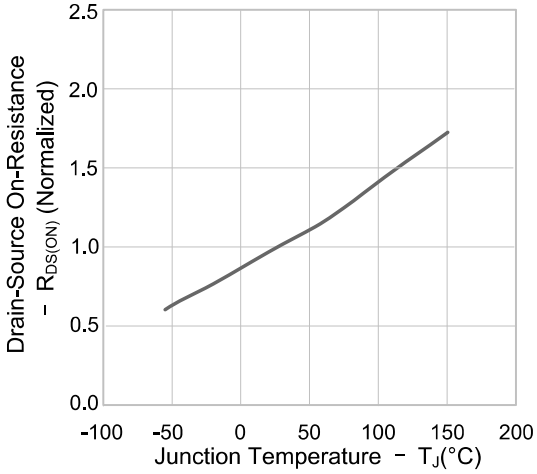
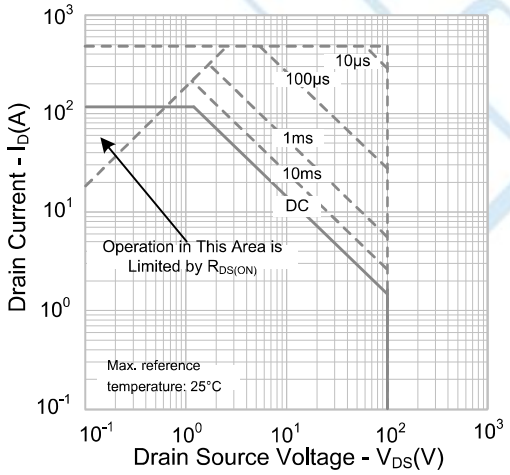
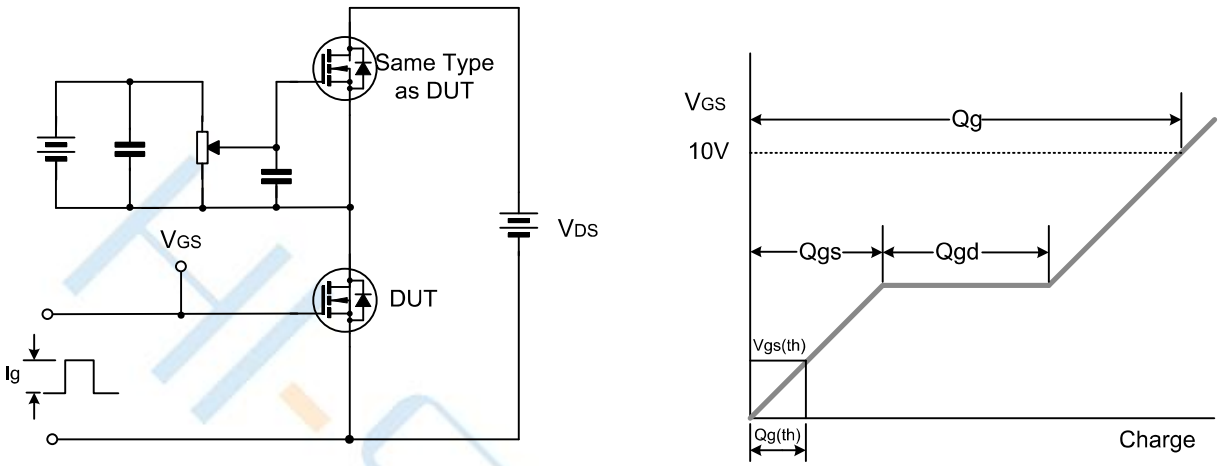


Figure 9. Max. Safe Operating Area

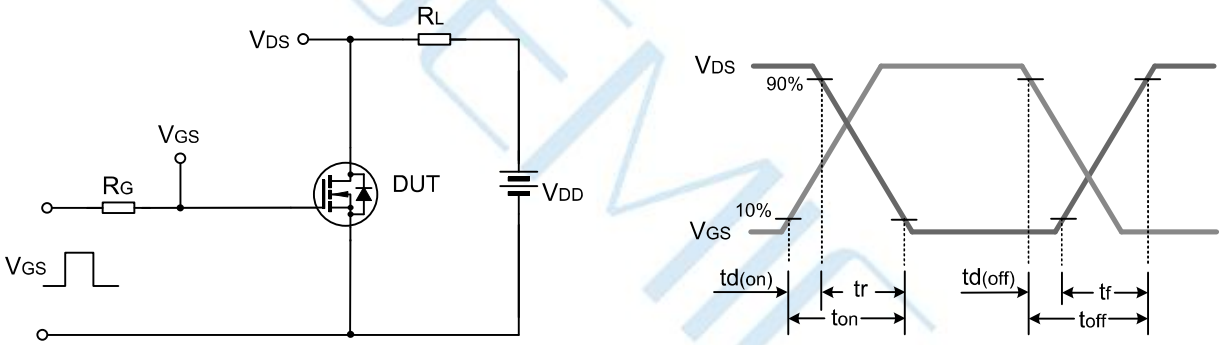


Test Circuit

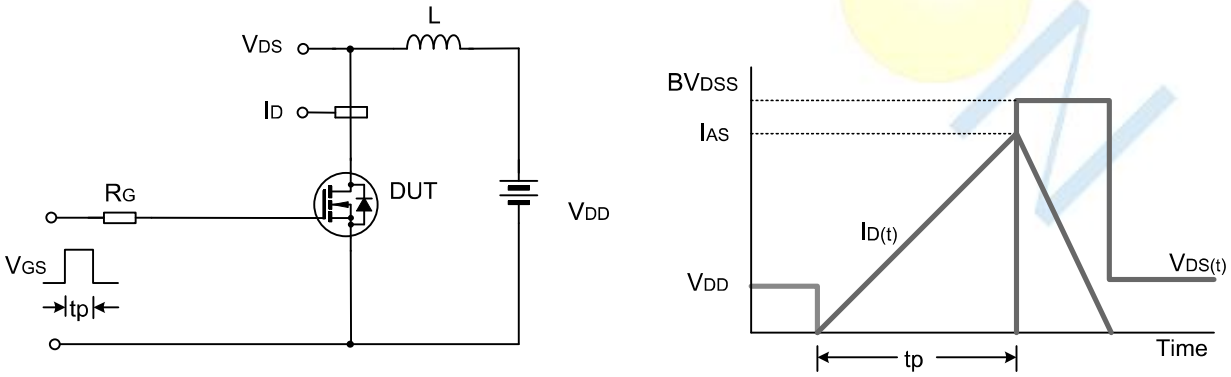
Gate Charge Test Circuit & Waveform



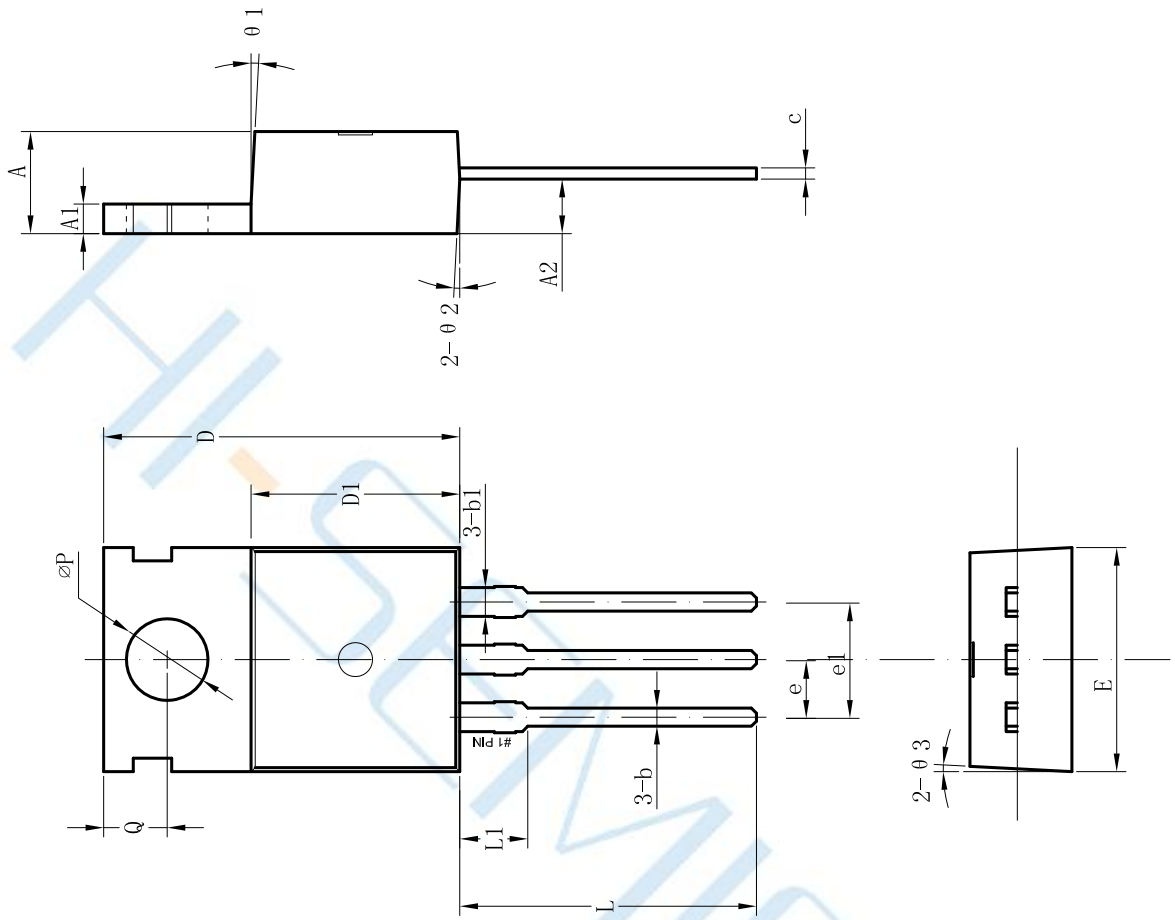
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



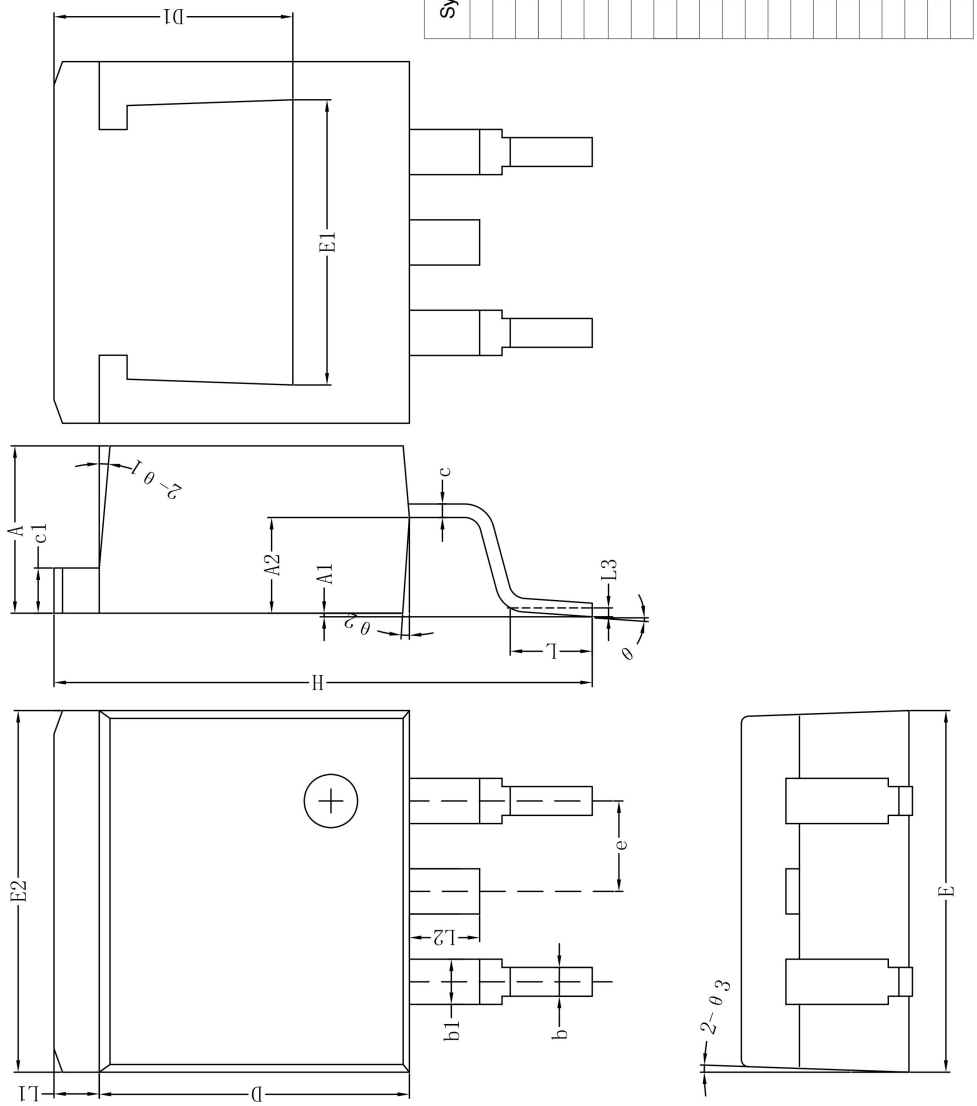
Package Dimensions of TO-220-3L



Symbol	Size/mm		
	Min	NOM	Max
A	4.30	4.50	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b1		1.27	
c	0.40	0.50	0.65
D	15.20	15.70	16.20
D1	9.00	9.20	9.40
E	9.70	10.0	10.10
e		2.54	
e1		5.08	
L	12.60	13.08	13.60
L1		3.00	
ΦP	3.50	3.60	3.80
Q	2.60	2.80	3.00
θ1		3°	
θ2		3°	
θ3		3°	

Package Dimensions of TO-263-2L

Symbol	Size /mm		
	MIN	NOM	MAX
A	4.55	4.70	4.85
A1	0	0.10	0.25
A2	2.59	2.69	2.89
b	0.71	0.81	0.96
b1		1.27	
c	0.36	0.38	0.61
c1	1.17	1.27	1.37
D	8.55	8.70	8.85
D1	6.70		7.70
E	10.01	10.16	10.31
E1	7.2		8.1
E2	9.98	10.08	10.18
e		2.54	
H	14.7	15.1	15.5
L	2.00	2.30	2.70
L1	1.17	1.27	1.40
L2			2.20
L3		0.25BSC	
θ	0	–	8°
θ1		5°	
θ2		4°	
θ3		4°	



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