



Description:

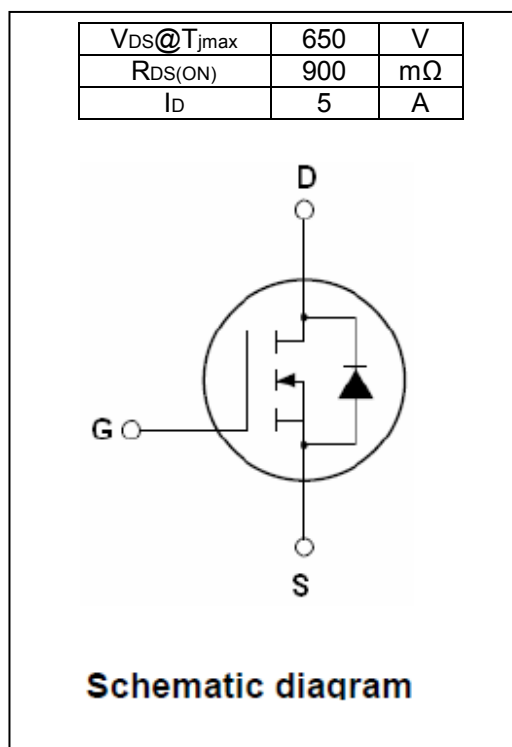
The series of devices use advanced super junction technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This super junction MOSFET fits the industry's AC-DC SMPS requirements for PFC, AC/DC power conversion, and industrial power applications.

Features:

- ◆ New technology for high voltage device
- ◆ Low on-resistance and low conduction losses
- ◆ Small package
- ◆ Ultra Low Gate Charge cause lower driving requirements
- ◆ 100% Avalanche Tested
- ◆ ROHS compliant

Applications:

- ◆ Power factor correction (PFC)
- ◆ Switched Mode Power Supplies (SMPS)
- ◆ Uninterruptible Power Supply (UPS)



Package Marking And Ordering Information:

Device	Device Package	Marking
SL05N60I	TO-251	SL05N60I
SL05N60K	TO-252	SL05N60K

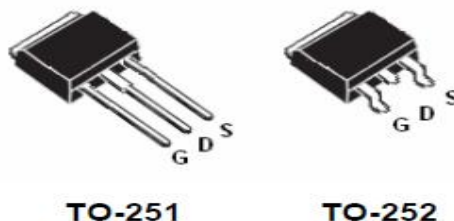


Table 1. Absolute Maximum Rating (TC=25°C)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	600	V
Gate-Source Voltage ($V_{DS}=0V$)	V_{GS}	±30	V
Continuous Drain Current at $T_c=25^\circ C$	$I_D (DC)$	5	A
Continuous Drain Current at $T_c=100^\circ C$	$I_D (DC)$	3	A
Pulsed Drain Current ^(Note 1)	$I_{DM} (pulse)$	15	A
Drain Source voltage slope, $V_{DS} = 480 V = 5 A, T_j = 125^\circ C$	dv/dt	50	V/ns
Maximum Power Dissipation ($T_c=25^\circ C$) Derate above $25^\circ C$	P_D	50 0.4	W W/°C
Single pulse avalanche energy ^(Note 2)	E_{AS}	130	mJ
Avalanche current ^(Note 1)	I_{AR}	5	A



Parameter	Symbol	Value	Unit
Repetitive Avalanche energy, t_{AR} limited by T_{jmax} (Note 1)	E_{AR}	0.4	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55...+150	°C

Table 2. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Maximum)	R_{thJC}	2.5	°C/W
Thermal Resistance, Junction-to-Ambient (Maximum)	R_{thJA}	75	°C/W

Table 3. Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
On / Off states						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	600			V
Zero Gate Voltage Drain Current ($T_C=25^\circ C$)	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$			1	μA
Zero Gate Voltage Drain Current ($T_C=125^\circ C$)	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$			50	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3	3.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=3A$		850	900	m Ω
Dynamic Characteristics						
Forward Transconductance	g_{FS}	$V_{DS} = 20V, I_D = 3A$		5		S
Input Capacitance	C_{iss}	$V_{DS} = 50V, V_{GS}=0V,$ $F=1.0MHz$		520		pF
Output Capacitance	C_{oss}			52		pF
Reverse Transfer Capacitance	C_{rss}			4.5		pF
Total Gate Charge	Q_g		$V_{DS} = 480V, I_D=5A,$ $V_{GS}=10V$		12	25
Gate-Source Charge	Q_{gs}			2.2		nC
Gate-Drain Charge	Q_{gd}			4.5		nC
Intrinsic gate resistance	R_G	$f = 1 MHz$ open drain		2.6		Ω
Switching times						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 380V, I_D=5A,$ $R_G=18\Omega, V_{GS}=10V$		6		nS
Turn-on Rise Time	t_r			2.5		nS
Turn-Off Delay Time	$t_{d(off)}$			55	80	nS
Turn-Off Fall Time	t_f			9	14	nS
Source-Drain Diode Characteristics						
Source-drain current (Body Diode)	I_{SD}	$T_C=25^\circ C$			5	A
Pulsed Source-drain current (Body Diode)	I_{SDM}				15	A
Forward on voltage	V_{SD}	$T_J=25^\circ C, I_{SD}=5A, V_{GS}=0V$		1	1.3	V
Reverse Recovery Time	t_{rr}	$T_J=25^\circ C, I_F=5A,$ $di/dt=100A/\mu s$		200		nS
Reverse Recovery Charge	Q_{rr}			1.6		μC
Peak reverse recovery current	I_{rrm}			15		A

Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $T_J=25^\circ C, V_{DD}=50V, V_G=10V, R_G=25\Omega$



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves)

Figure1. Safe operating area

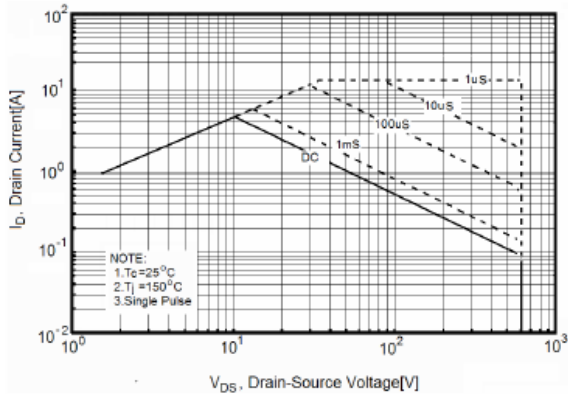


Figure2. Source-Drain Diode Forward Voltage

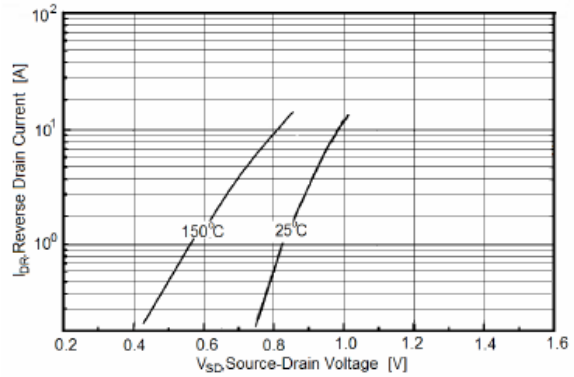


Figure3. Output characteristics

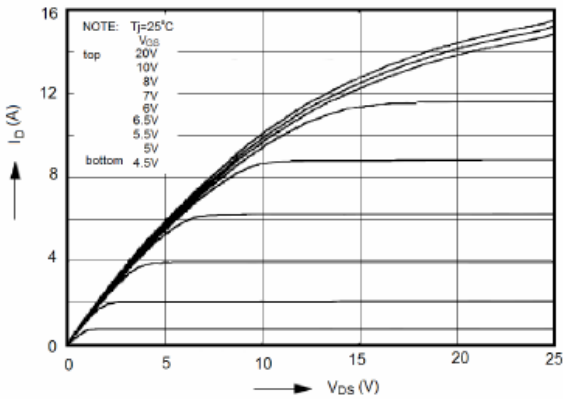


Figure4. Transfer characteristics

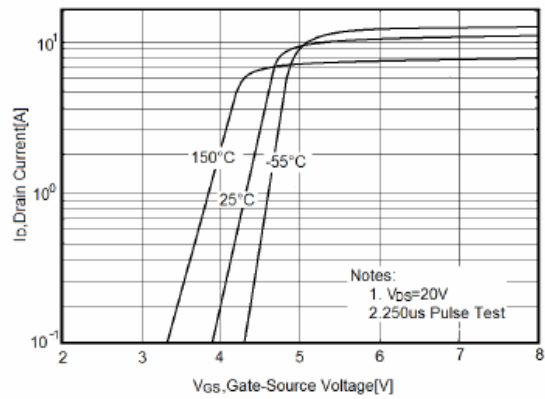


Figure5. Static drain-source on resistance

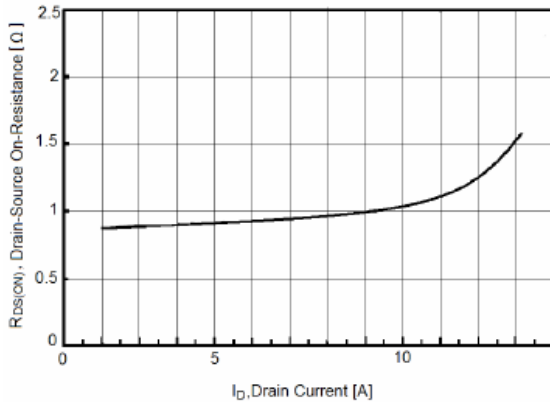
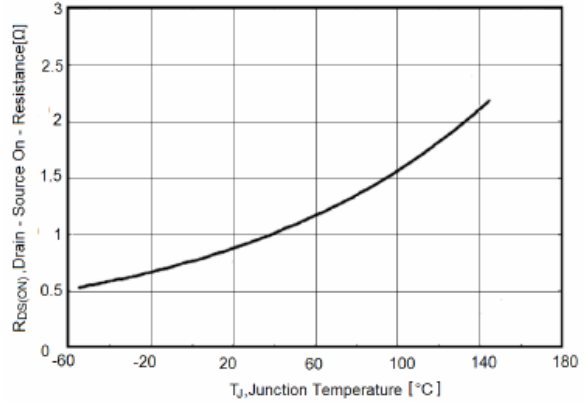


Figure6. RDS(ON) vs Junction Temperature



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves) continued

Figure7. BV_{DSS} vs Junction Temperature

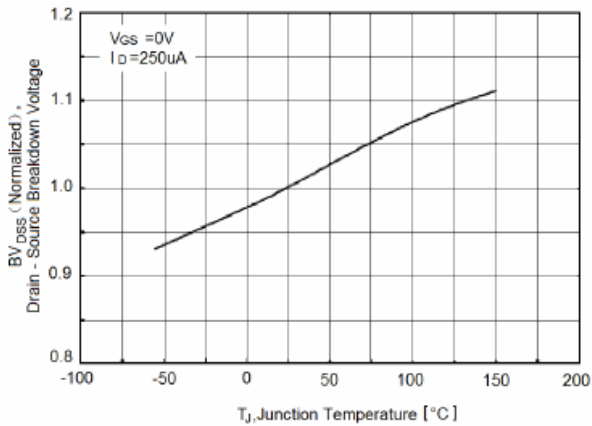


Figure8. Maximum I_D vs Junction Temperature

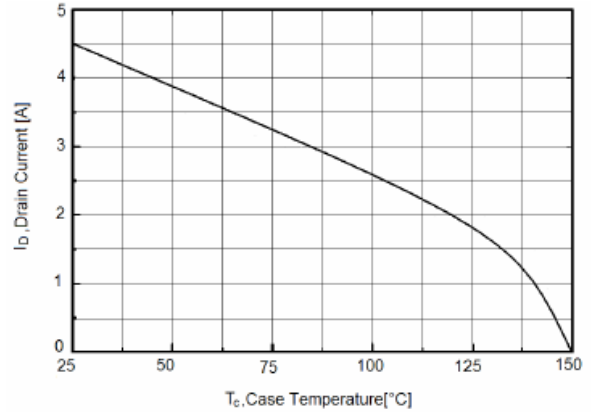


Figure9. Gate charge waveforms

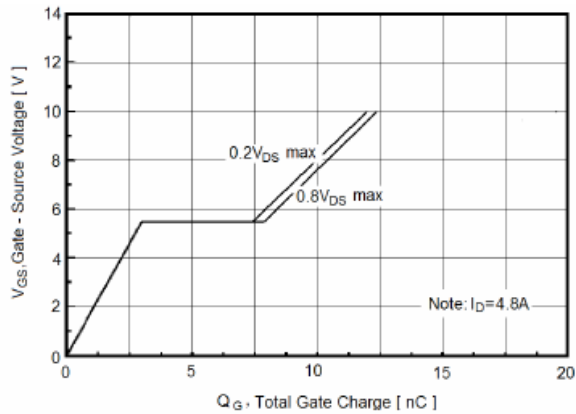


Figure10. Capacitance

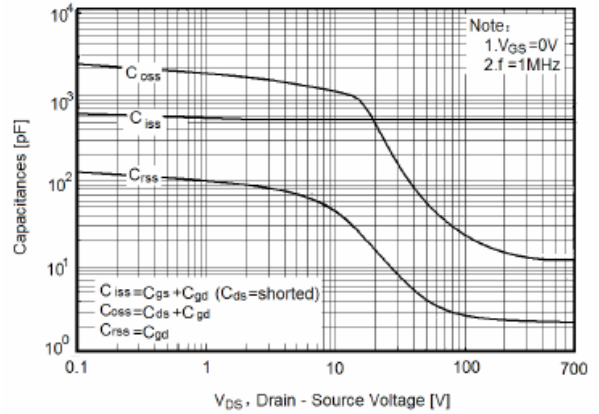
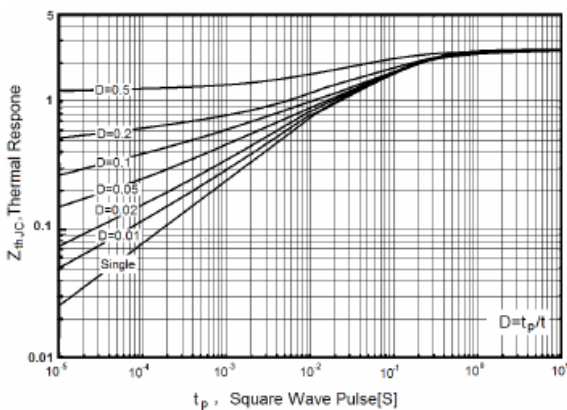


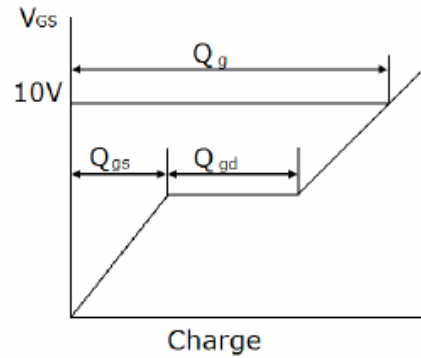
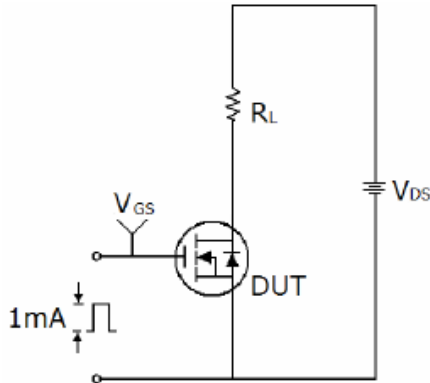
Figure11. Transient Thermal Impedance



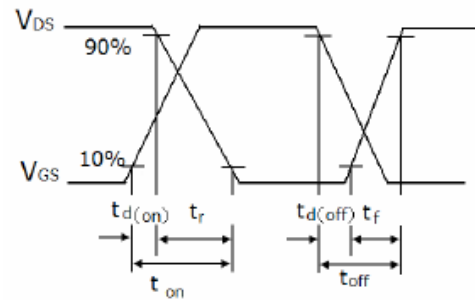
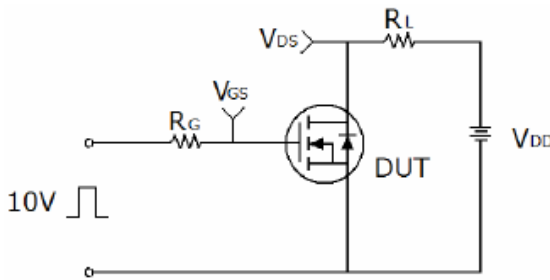


TEST CIRCUIT

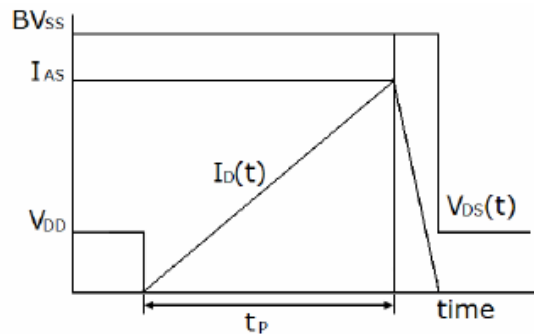
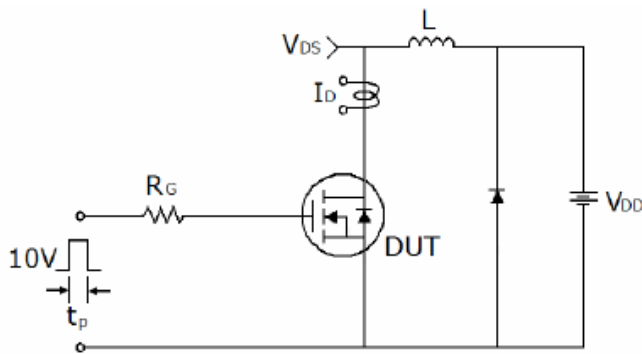
1) Gate charge test circuit & Waveform



2) Switch Time Test Circuit:

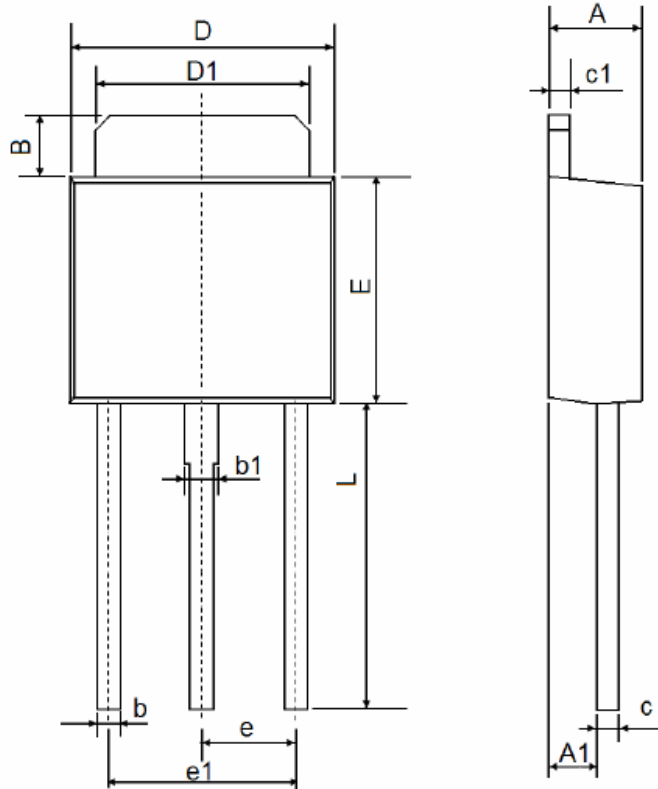


3) Unclamped Inductive Switching Test Circuit & Waveforms





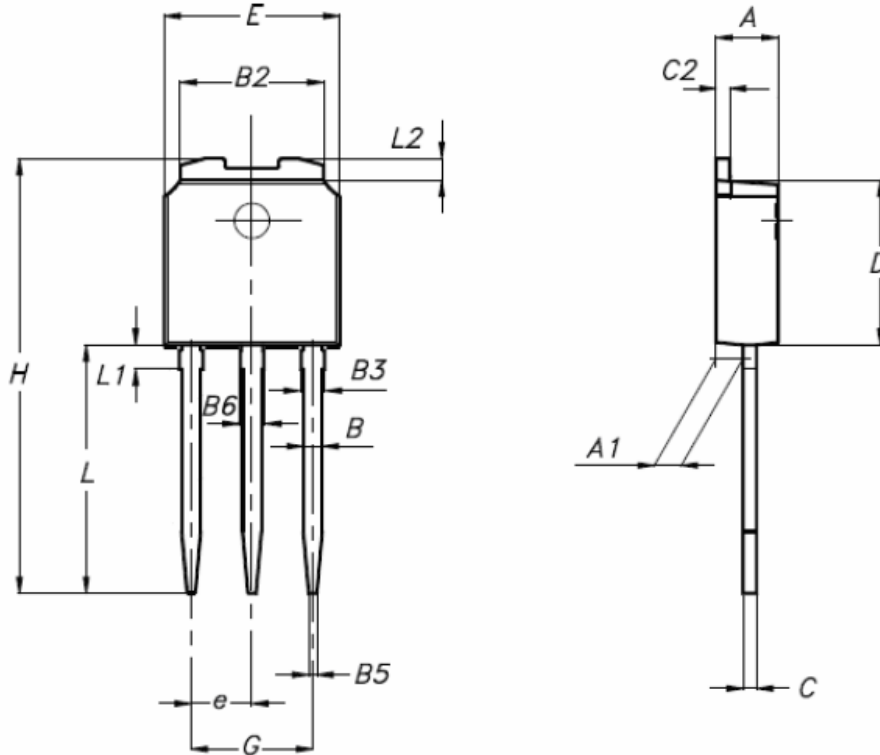
TO-251 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	1.050	1.350	0.042	0.054
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	7.500	7.900	0.295	0.311



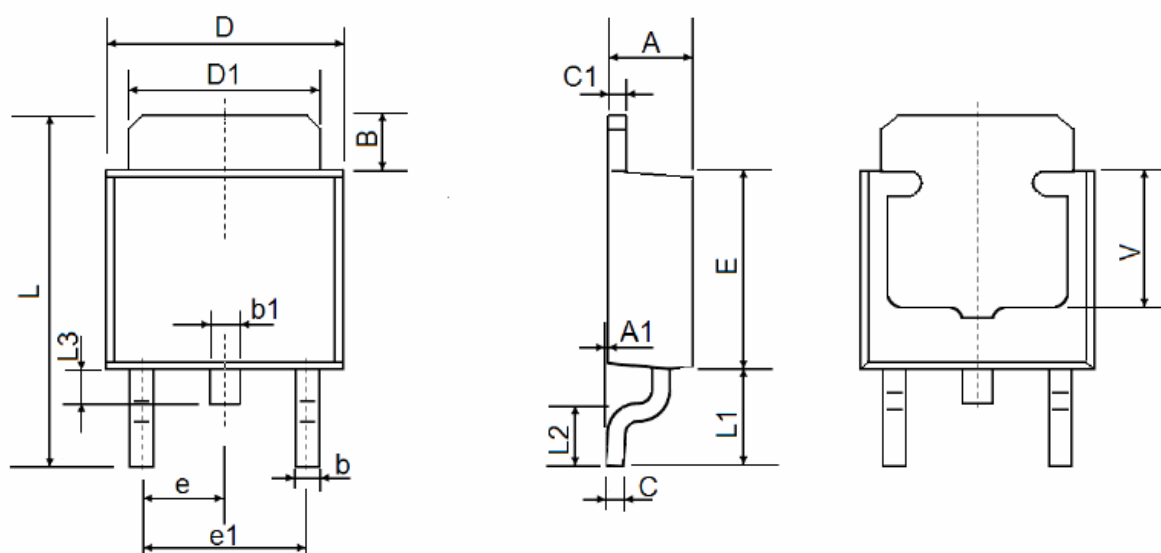
TO-251 (STS) Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.095
A1	0.90	1.10	0.036	0.044
B	0.64	0.90	0.025	0.036
B2	5.20	5.40	0.206	0.214
B3		0.95		0.038
B5	0.3 TYP		0.012TYP	
B6		0.95		0.038
C	0.45	0.60	0.018	0.024
C2	0.48	0.60	0.019	0.024
D	6.00	6.20	0.237	0.245
E	6.40	6.60	0.253	0.261
e	2.28 TYP		0.090 TYP	
G	4.40	4.60	0.174	0.182
H	15.90	16.30	0.629	0.645
L	9.00	9.40	0.356	0.372
L1	0.80	1.20	0.032	0.047
L2	0.80TYP	1.00	0.032TYP	0.040



TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400		0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
C	0.430	0.580	0.017	0.023
C1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	0.900	0.024	0.035
V	3.800 REF		0.150 REF	