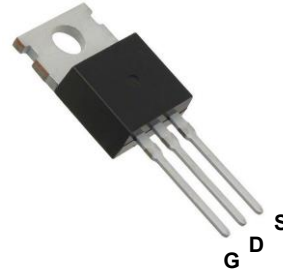
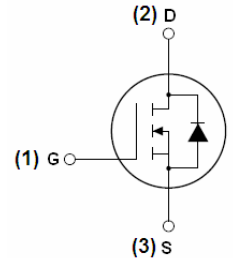


## Main Product Characteristics

$V_{(BR)DSS}$	100V
$R_{DS(ON)}$	5.3mΩ(Typ.)
	6.8mΩ(Max.)
$I_D$	130A



TO-220



Schematic Diagram

## Features and Benefits

- Advanced MOSFET process technology
- Ideal for battery operated systems, load switching, power converters and other general purpose applications
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



## Description

The SSFH1013 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

## Absolute Maximum Ratings and Thermal Characteristic

( $T_C=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	130	A
Drain Current-Continuous( $T_C=100^\circ\text{C}$ )	$I_{D(100^\circ\text{C})}$	92	A
Pulsed Drain Current	$I_{DM}$	500	A
Maximum Power Dissipation	$P_D$	285	W
Derating Factor		1.9	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy <sup>5</sup>	$E_{AS}$	1100	mJ
Operating Junction and Storage Temperature	$T_J, T_{STG}$	-55 to +175	$^\circ\text{C}$
Thermal Resistance, Junction-to-Case <sup>2</sup>	$R_{\theta JC}$	0.53	$^\circ\text{C/W}$

## Electrical Characteristics

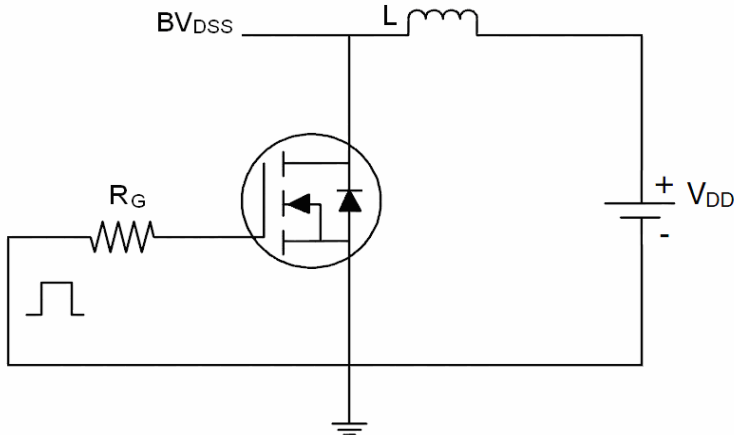
( $T_C=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	110	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics<sup>3</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3.0	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	5.3	6.8	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=20A$	40	-	-	S
<b>Dynamic Characteristics<sup>4</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=50V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	7100	-	PF
Output Capacitance	$C_{oss}$		-	413	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	333	-	PF
<b>Switching Characteristics<sup>4</sup></b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=50V, R_L=2.5\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$	-	31	-	nS
Turn-on Rise Time	$t_r$		-	24	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	45	-	nS
Turn-Off Fall Time	$t_f$		-	27	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=50V, I_D=65A,$ $V_{GS}=10V$	-	170	-	nC
Gate-Source Charge	$Q_{gs}$		-	38	-	nC
Gate-Drain Charge	$Q_{gd}$		-	65	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>3</sup>	$V_{SD}$	$V_{GS}=0V, I_S=40A$	-	0.85	1.2	V
Diode Forward Current <sup>2</sup>	$I_S$		-	-	130	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ\text{C}, I_F=20A$ $di/dt = 100A/\mu S^3$	-	65	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	110	-	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

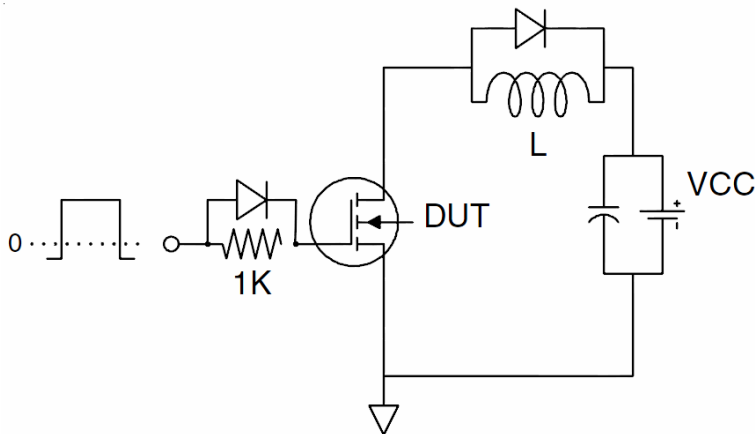
### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu S$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5.  $E_{AS}$  condition:  $T_J=25^\circ\text{C}$ ,  $V_{DD}=50V$ ,  $V_G=10V$ ,  $L=1\text{mH}$ ,  $R_g=25\Omega$

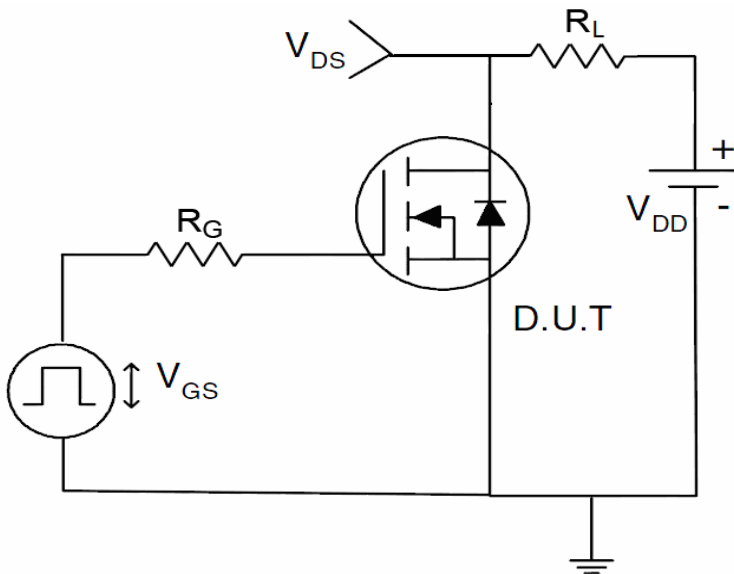
**Test Circuit**



**Figure 1 E<sub>AS</sub> Test Circuit**

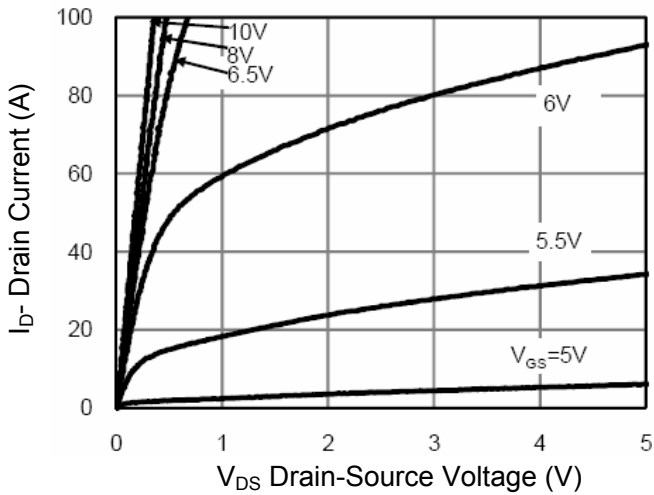


**Figure 2 Gate Charge Test Circuit**

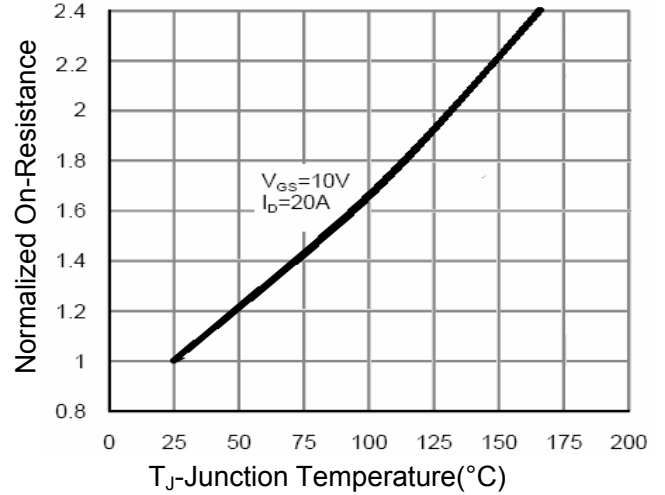


**Figure 3 Switch Time Test Circuit**

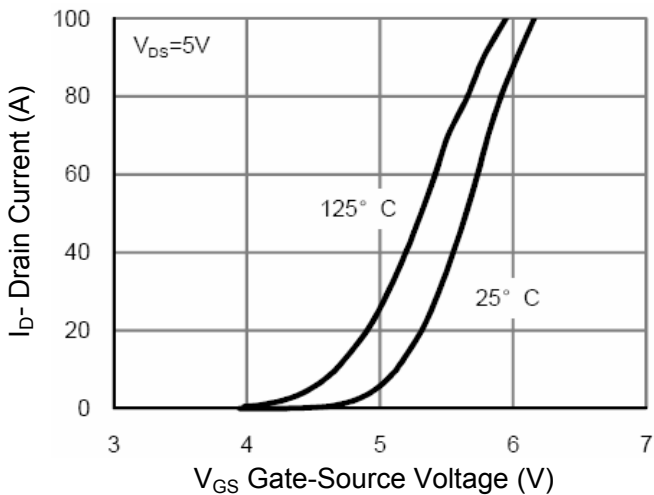
**Typical Electrical and Thermal Characteristic Curves**



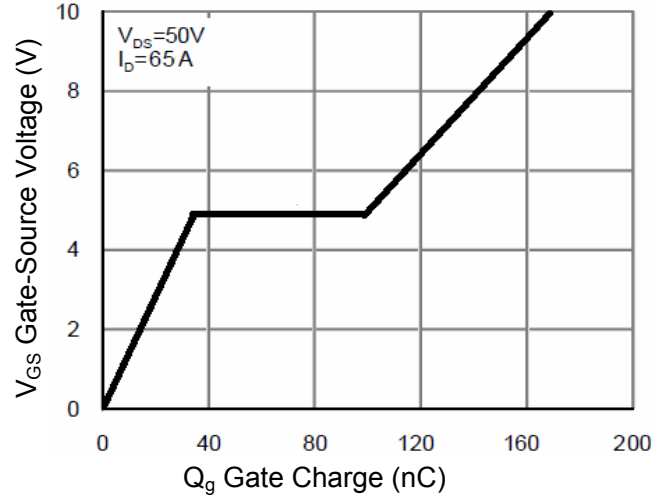
**Figure 4 Output Characteristics**



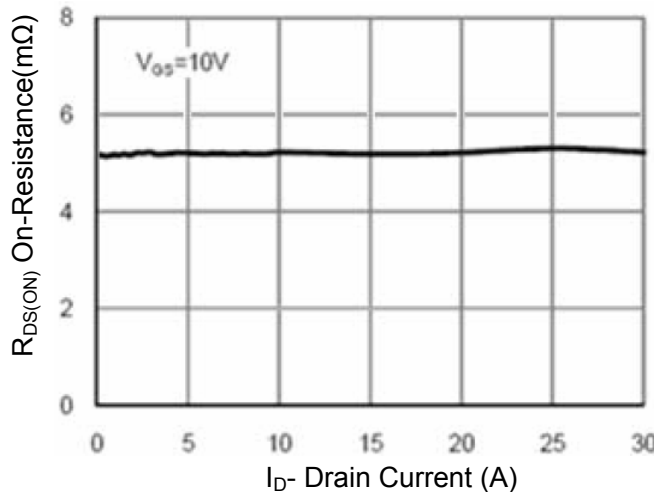
**Figure 5  $R_{DS(ON)}$ -Junction Temperature**



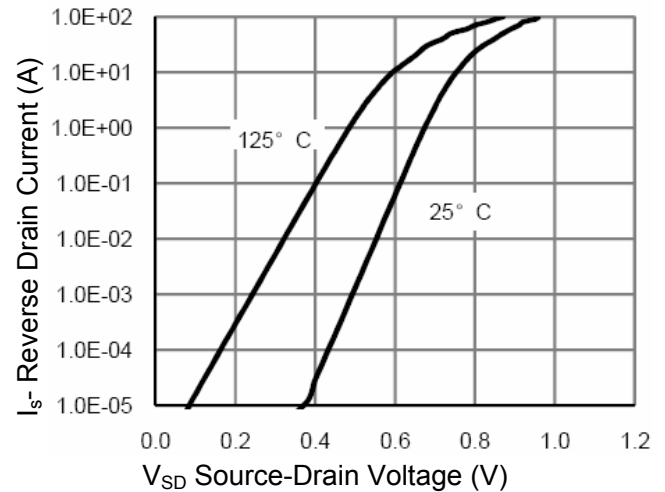
**Figure 6 Transfer Characteristics**



**Figure 7 Gate Charge**

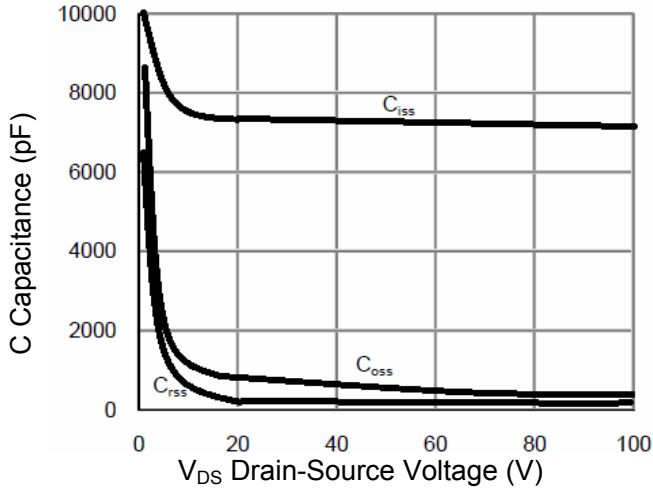


**Figure 8  $R_{DS(ON)}$ - Drain Current**

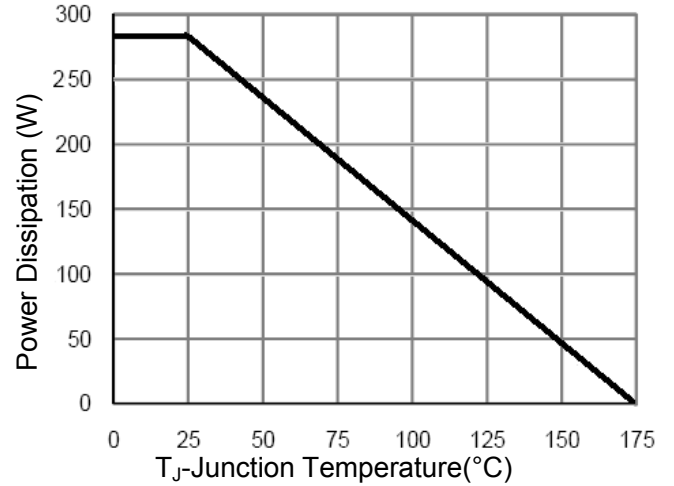


**Figure 9 Source- Drain Diode Forward**

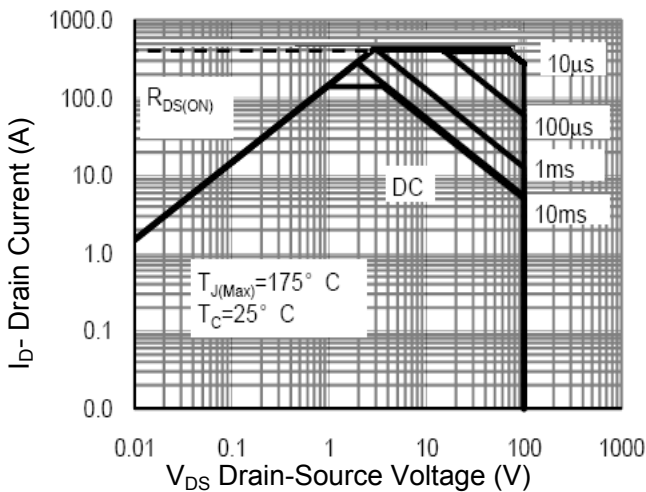
**Typical Electrical and Thermal Characteristic Curves**



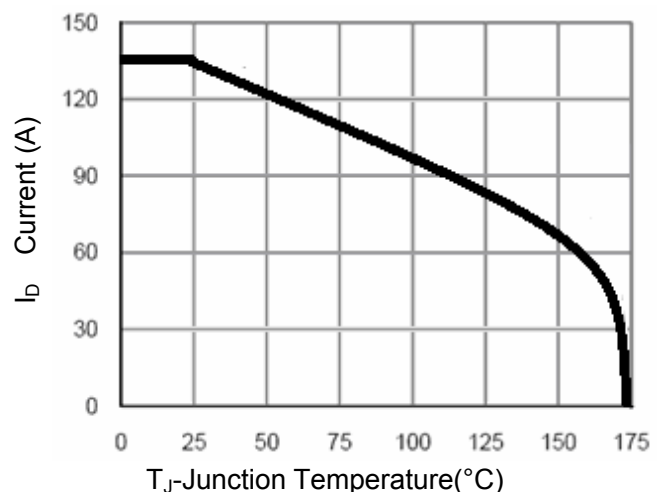
**Figure 10 Capacitance vs  $V_{DS}$**



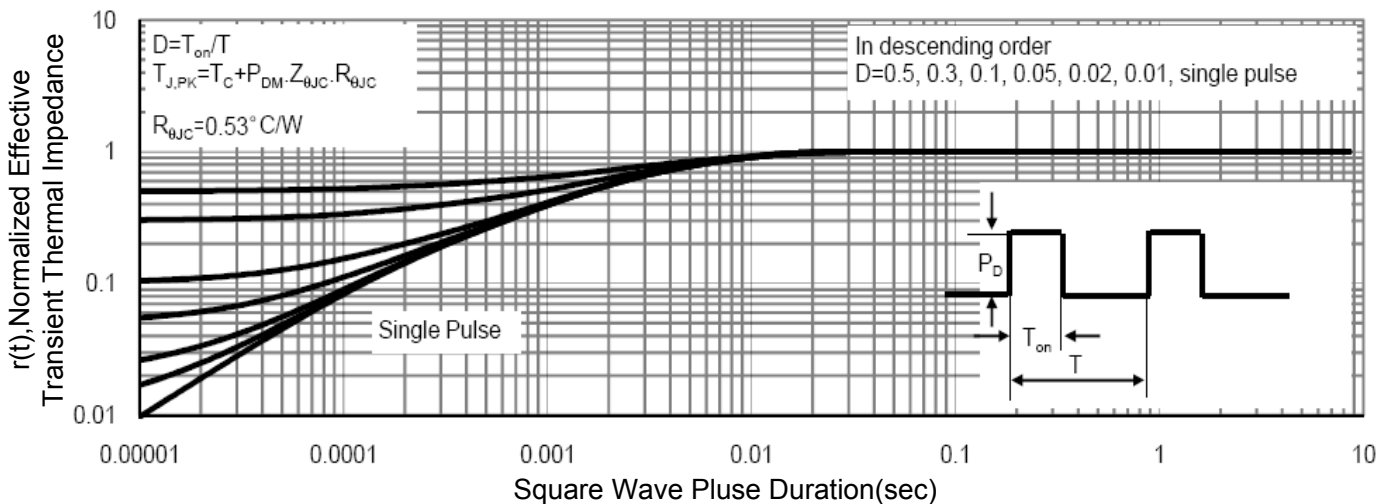
**Figure 11 Power De-rating**



**Figure 12 Safe Operation Area**



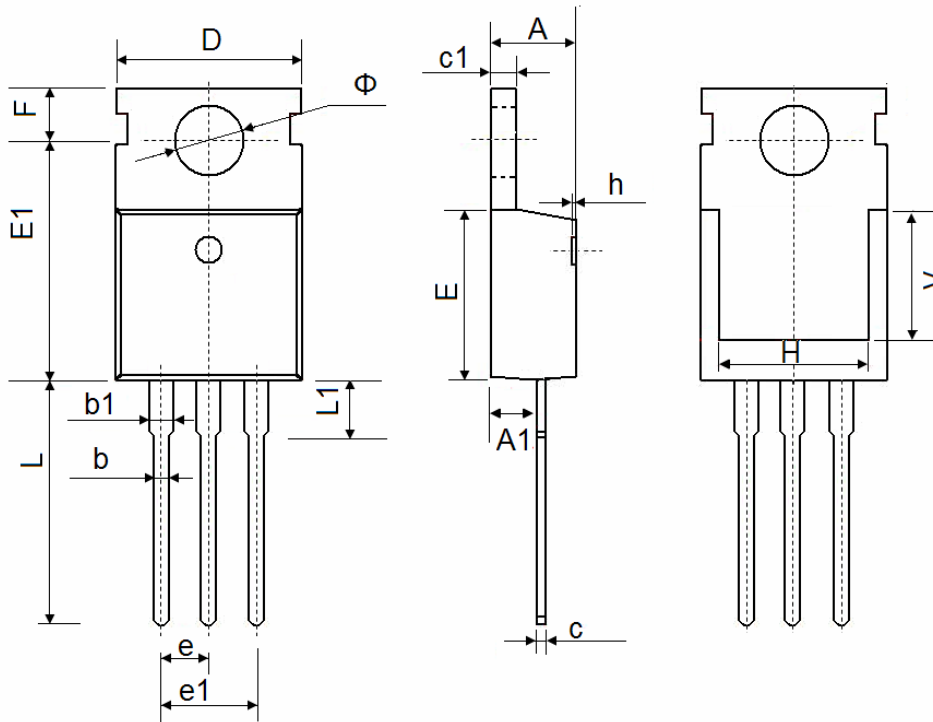
**Figure 13  $I_D$  Current- Junction Temperature**



**Figure 14 Normalized Maximum Transient Thermal Impedance**

**Package Outline Dimensions**

**TO-220**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150