

## 150V N-Ch Power MOSFET

### Feature

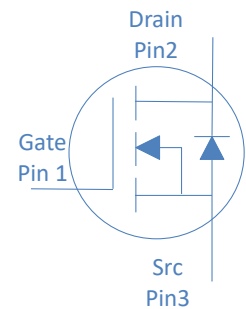
- ◇ High Speed Power Smooth Switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free

### Application

- ◇ Synchronous Rectification in SMPS
- ◇ Hard Switching and High Speed Circuit
- ◇ Power Tools
- ◇ UPS
- ◇ Motor Control

$V_{DS}$	150	V
$R_{DS(on),typ}$	13.5	mΩ
$I_D$ (Silicon Limited)	33	A

TO-220F



Part Number	Package	Marking
HGA155N15S	TO-220F	GA155N15S

### Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current (Silicon Limited)	$I_D$	$T_C=25^\circ\text{C}$	33	A
		$T_C=100^\circ\text{C}$	23	
Drain to Source Voltage	$V_{DS}$	-	150	V
Gate to Source Voltage	$V_{GS}$	-	$\pm 20$	V
Pulsed Drain Current	$I_{DM}$	-	220	A
Avalanche Energy, Single Pulse	$E_{AS}$	$L=0.4\text{mH}, T_C=25^\circ\text{C}$	125	mJ
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	42	W
Operating and Storage Temperature	$T_J, T_{stg}$	-	-55 to 175	$^\circ\text{C}$

### Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Case	$R_{\theta JC}$	3.6	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	60	$^\circ\text{C}/\text{W}$

## Electrical Characteristics at $T_J=25^{\circ}\text{C}$ (unless otherwise specified)

### Static Characteristics

Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	150	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	2.9	4	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS}=0V, V_{DS}=150V, T_J=25^{\circ}\text{C}$	-	-	1	$\mu A$
		$V_{GS}=0V, V_{DS}=150V, T_J=100^{\circ}\text{C}$	-	-	100	
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		13.5	16	$m\Omega$
Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=20A$	-	58	-	S
Gate Resistance	$R_G$	$V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$	-	1.0	-	$\Omega$

### Dynamic Characteristics

Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=75V, f=1\text{MHz}$	-	2500	-	$pF$
Output Capacitance	$C_{oss}$		-	183	-	
Reverse Transfer Capacitance	$C_{rss}$		-	10	-	
Total Gate Charge	$Q_g$	$V_{DD}=75V, I_D=20A, V_{GS}=10V$	-	29	-	nC
Gate to Source Charge	$Q_{gs}$		-	9	-	
Gate to Drain (Miller) Charge	$Q_{gd}$		-	4	-	
Turn on Delay Time	$t_{d(on)}$	$V_{DD}=75V, I_D=20A, V_{GS}=10V, R_G=10\Omega,$	-	12	-	ns
Rise time	$t_r$		-	8	-	
Turn off Delay Time	$t_{d(off)}$		-	20	-	
Fall Time	$t_f$		-	9	-	

### Reverse Diode Characteristics

Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_F=20A$	-	0.9	-	V
Reverse Recovery Time	$t_{rr}$	$V_R=75V, I_F=20A, di_F/dt=100A/\mu s$	-	68	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	116	-	nC

Fig 1. Typical Output Characteristics

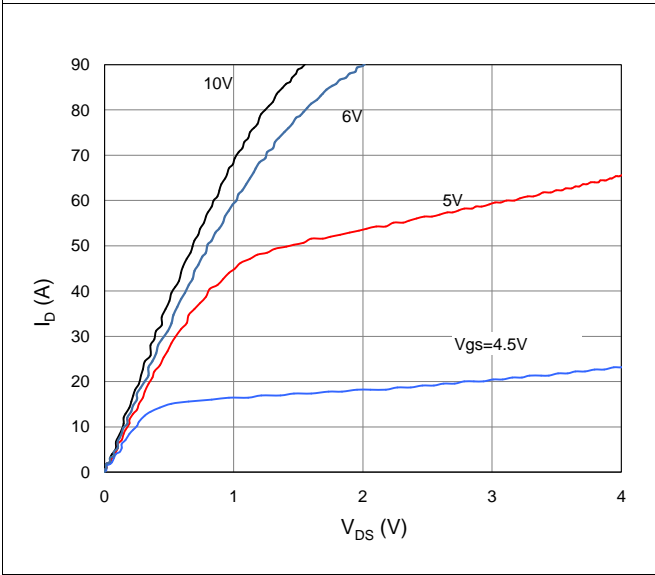


Figure 2. On-Resistance vs. Gate-Source Voltage

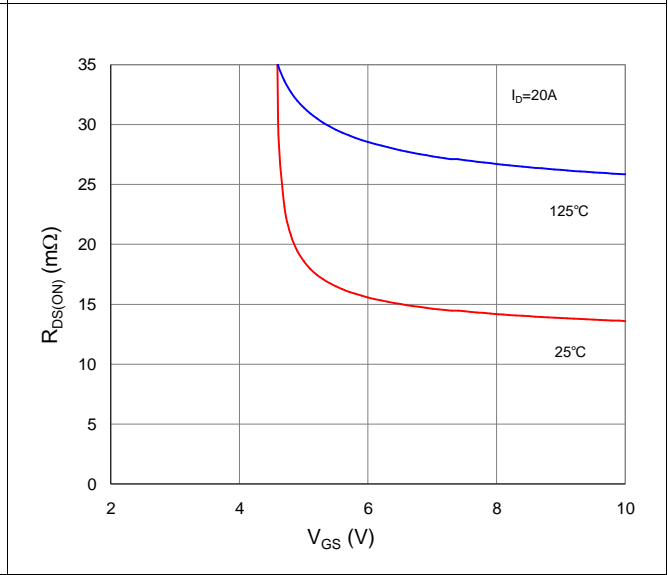


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

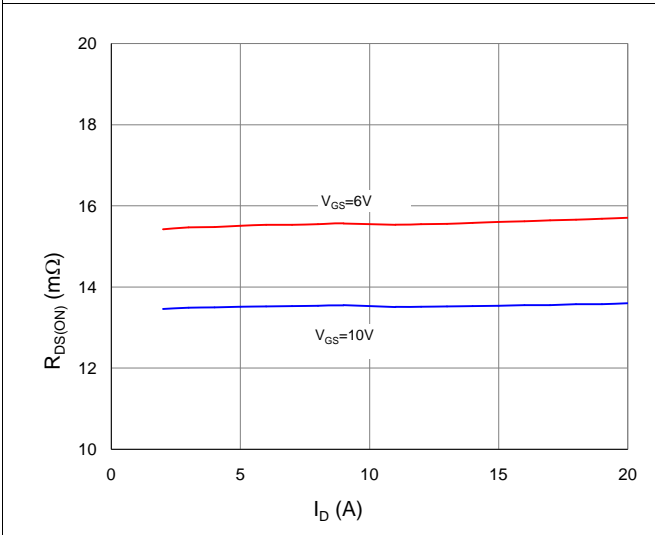


Figure 4. Normalized On-Resistance vs. Junction Temperature

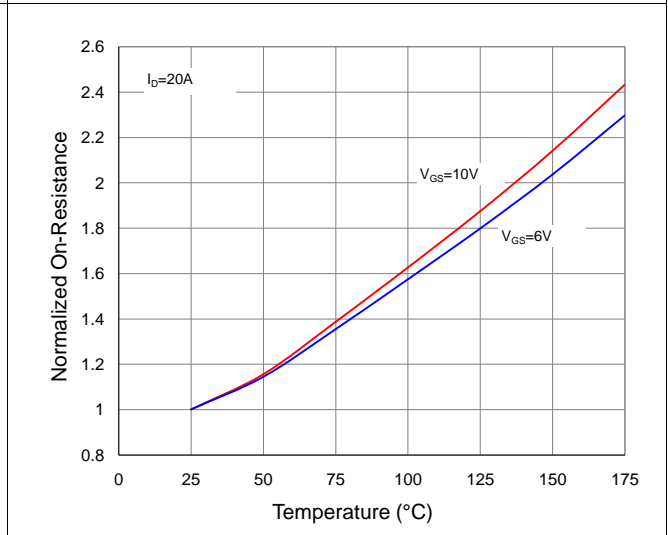


Figure 5. Typical Transfer Characteristics

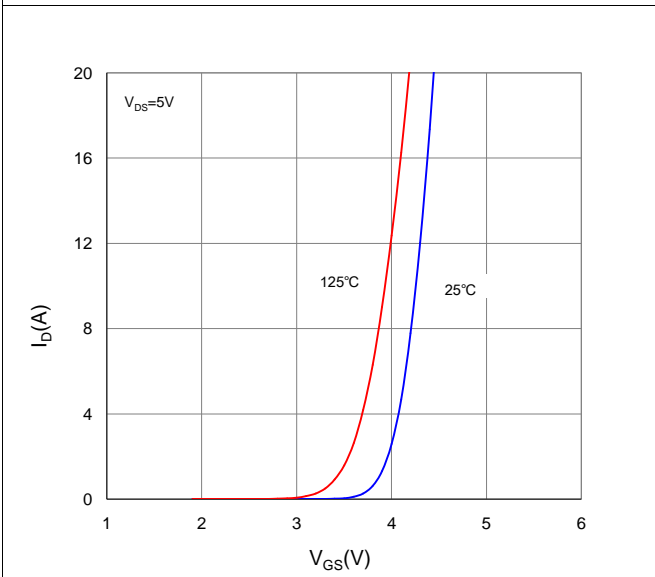


Figure 6. Typical Source-Drain Diode Forward Voltage

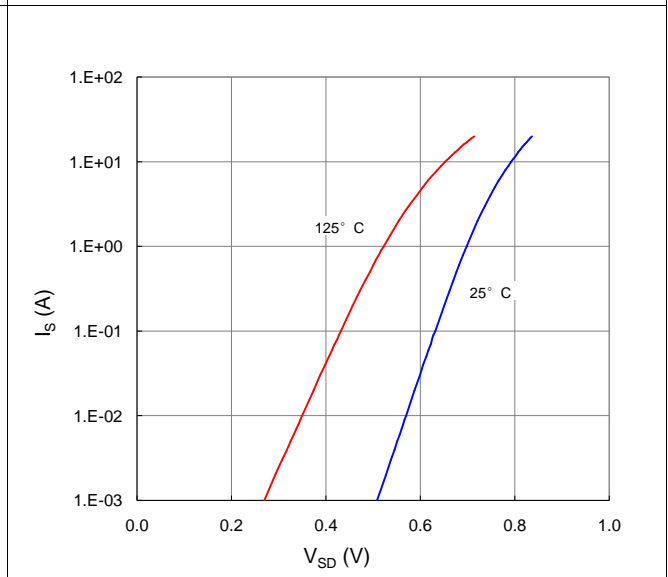


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

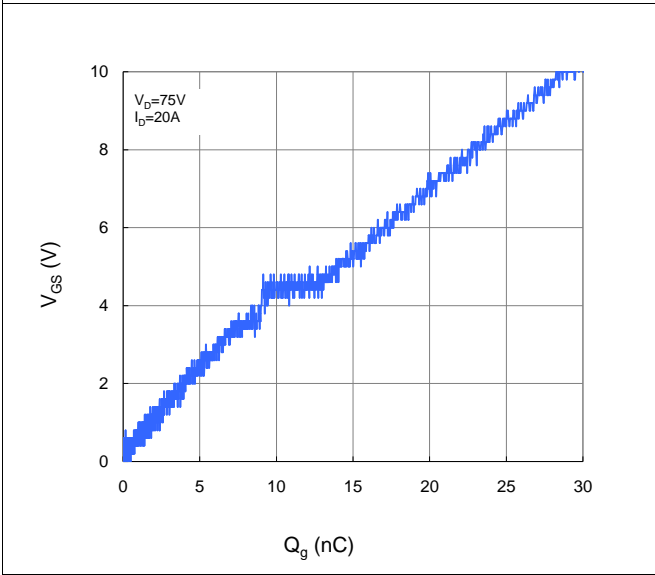


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

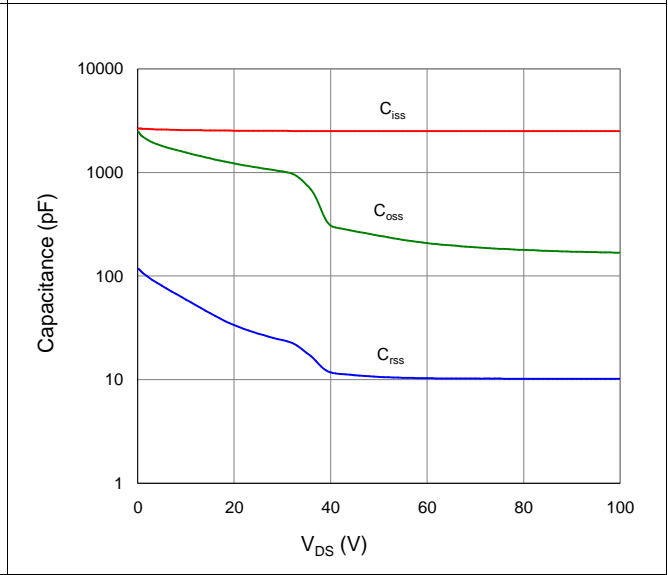


Figure 9. Maximum Safe Operating Area

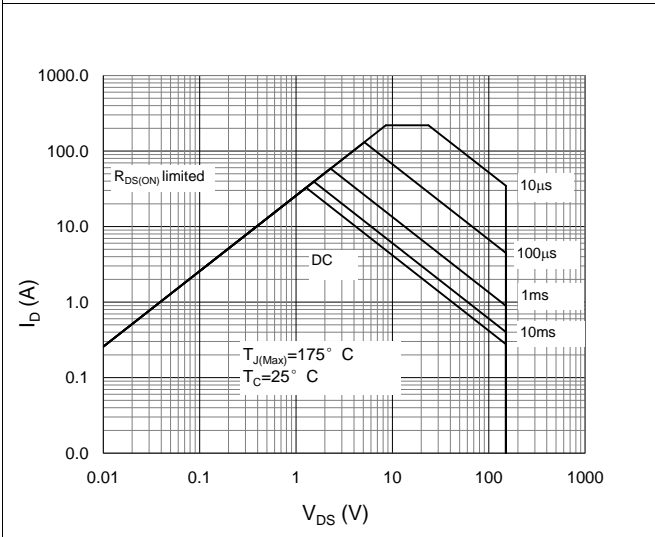


Figure 10. Maximum Drain Current vs. Case Temperature

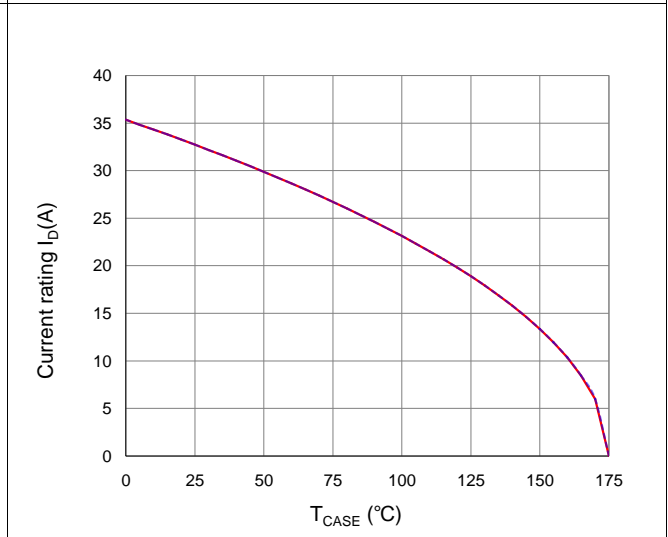
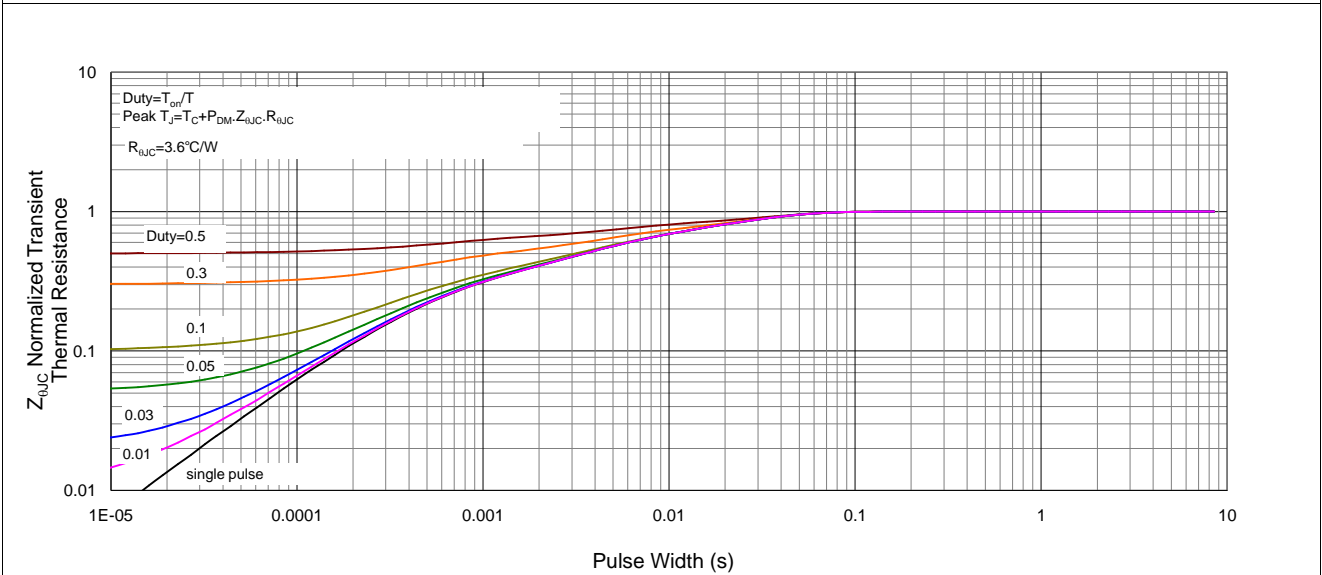
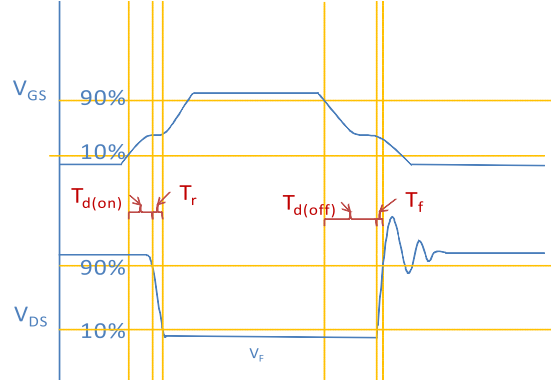
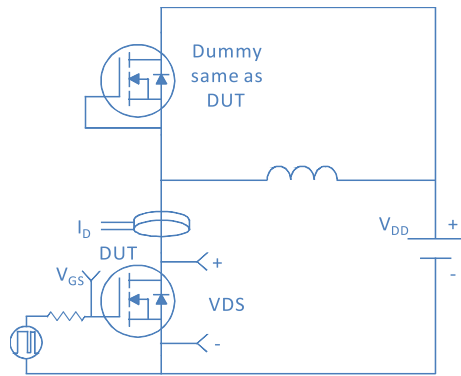


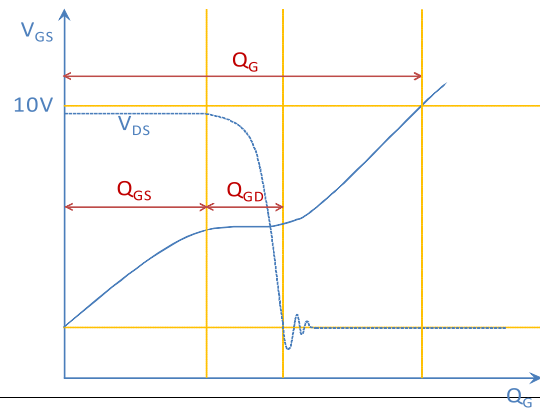
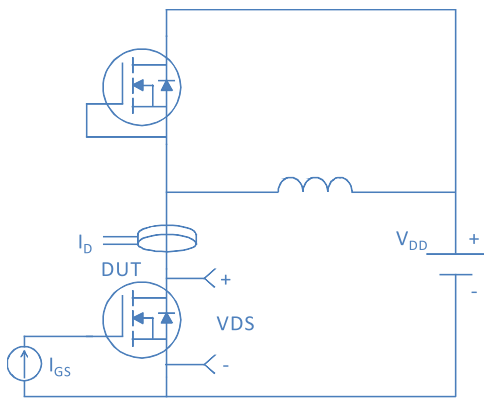
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



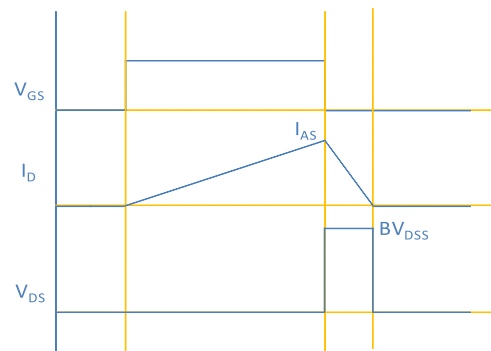
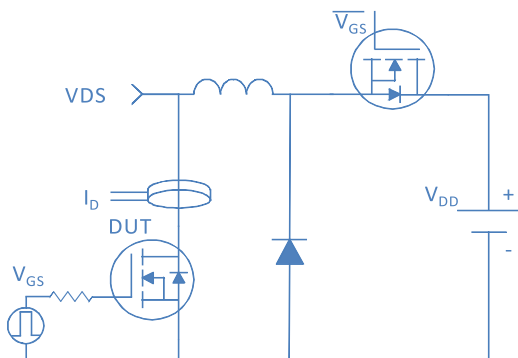
### Inductive switching Test



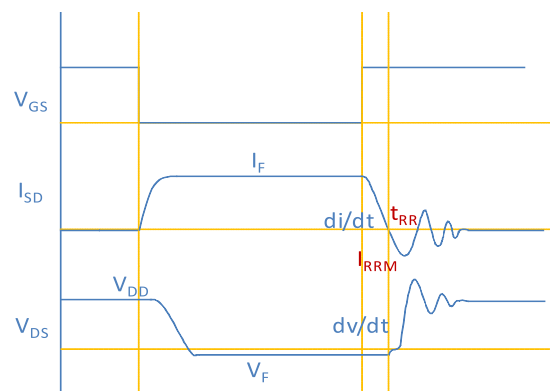
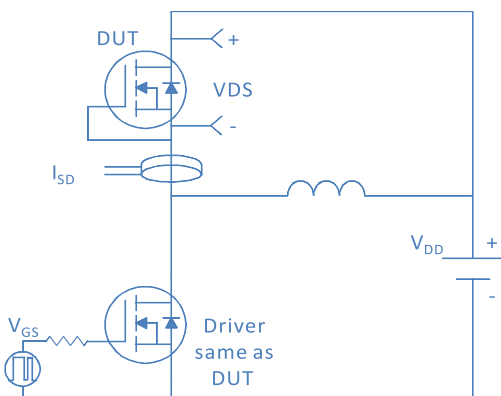
### Gate Charge Test



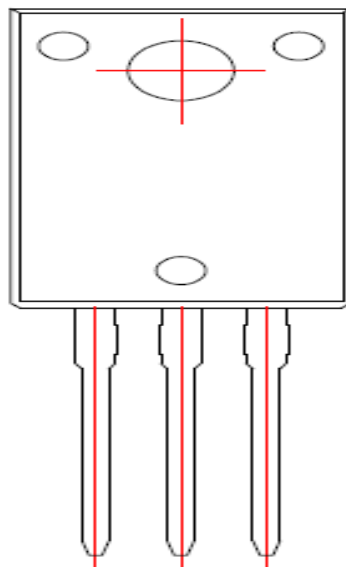
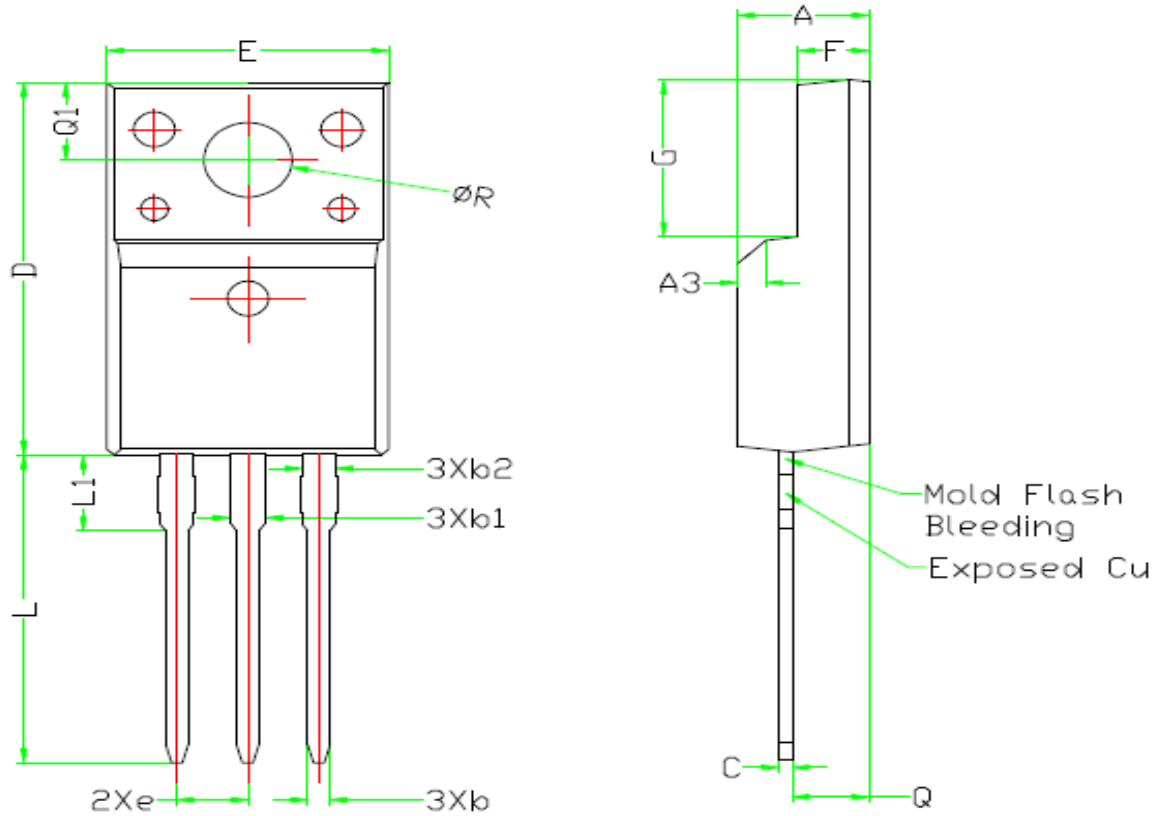
### Unclamped Inductive Switching (UIS) Test



### Diode Recovery Test



## TO-220F, 3 leads



**BOTTOM VIEW**

SYMBOL	DIMENSIONS		
	Min.	Nom.	Max.
A	4.60	4.70	4.80
b	0.70	0.80	0.91
b1	1.20	1.30	1.47
b2	1.10	1.20	1.30
C	0.45	0.50	0.63
D	15.80	15.87	15.97
e	2.54		
E	10.00	10.10	10.30
F	2.44	2.54	2.64
G	6.50	6.70	6.90
L	12.90	13.10	13.30
L1	3.13	3.23	3.33
Q	2.65	2.75	2.85
Q1	3.20	3.30	3.40
$\phi R$	3.06	3.18	3.28

**Note:**

1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash And Burrs  
Mold Flash Should Be Less Than 6 Mil.