

## 200V 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

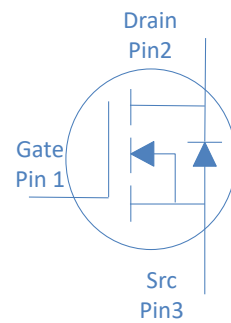
$V_{DS}$	200	V
$R_{DS(on),max}$	4.7	mΩ
$I_D$ (Silicon Limited)	219	A

### Application

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

Part Number	Package	Marking
HG3P056N20S	TO-3P	G3P056N20S

TO-3P



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

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current(Silicon Limited)	$I_D$	$T_C=25^\circ\text{C}$	219	A
		$T_C=100^\circ\text{C}$	155	
Continuous Drain Current(Package Limited)	$I_D$	$T_C=25^\circ\text{C}$	140	
Drain to Source Voltage	$V_{DS}$	-	200	V
Gate to Source Voltage	$V_{GS}$	-	$\pm 20$	V
Pulsed Drain Current	$I_{DM}$	-	740	A
Avalanche Energy, Single Pulse	$E_{AS}$	$L=0.4\text{mH}, T_C=25^\circ\text{C}$	720	mJ
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	600	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	$R_{\theta JC}$	0.25	$^\circ\text{C/W}$
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	40	$^\circ\text{C/W}$

**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	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	200	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS}=0V, V_{DS}=160V, T_J=25^{\circ}\text{C}$	-	-	1	$\mu A$
		$V_{GS}=0V, V_{DS}=160V, T_J=100^{\circ}\text{C}$	-	-	100	
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	4.7	5.6	m $\Omega$
Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=20A$	-	90	-	S
Gate Resistance	$R_G$	$V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$	-	2.0	-	$\Omega$

**Dynamic Characteristics**

Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$	-	9940	-	pF
Output Capacitance	$C_{oss}$		-	840	-	
Reverse Transfer Capacitance	$C_{rss}$		-	15	-	
Total Gate Charge	$Q_g$	$V_{DD}=100V, I_D=20A, V_{GS}=10V$	-	112	-	nC
Gate to Source Charge	$Q_{gs}$		-	36	-	
Gate to Drain (Miller) Charge	$Q_{gd}$		-	10	-	
Turn on Delay Time	$t_{d(on)}$	$V_{DD}=100V, I_D=20A, V_{GS}=10V,$ $R_G=10\Omega,$	-	32	-	ns
Rise time	$t_r$		-	44	-	
Turn off Delay Time	$t_{d(off)}$		-	76	-	
Fall Time	$t_f$		-	20	-	

**Reverse Diode Characteristics**

Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_F=20A$	-	0.9	-	V
Reverse Recovery Time	$t_{rr}$	$V_R=100V, I_F=20A, dI_F/dt=100A/\mu s$	-	280	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	1260	-	nC

Fig 1. Typical Output Characteristics

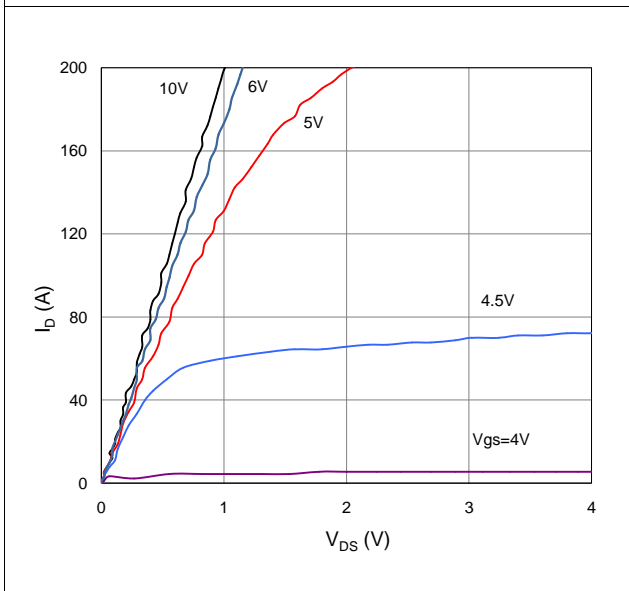


Figure 2. On-Resistance vs. Gate-Source Voltage

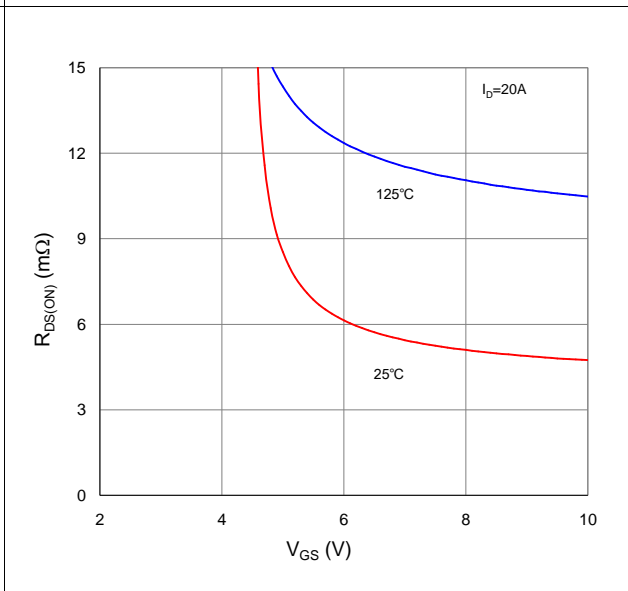


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

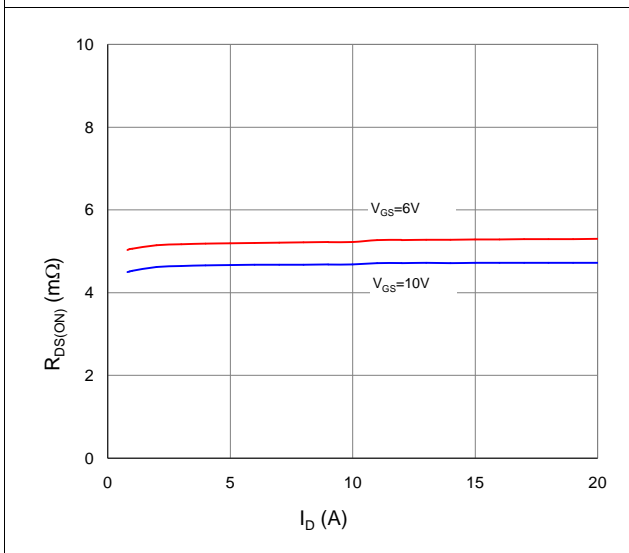


Figure 4. Normalized On-Resistance vs. Junction Temperature

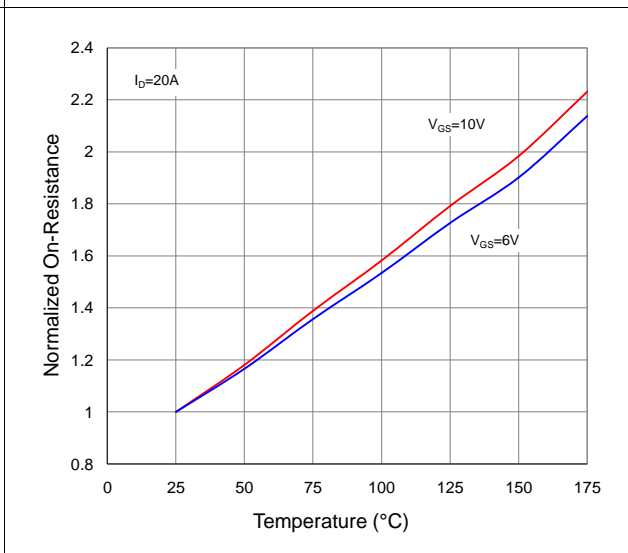


Figure 5. Typical Transfer Characteristics

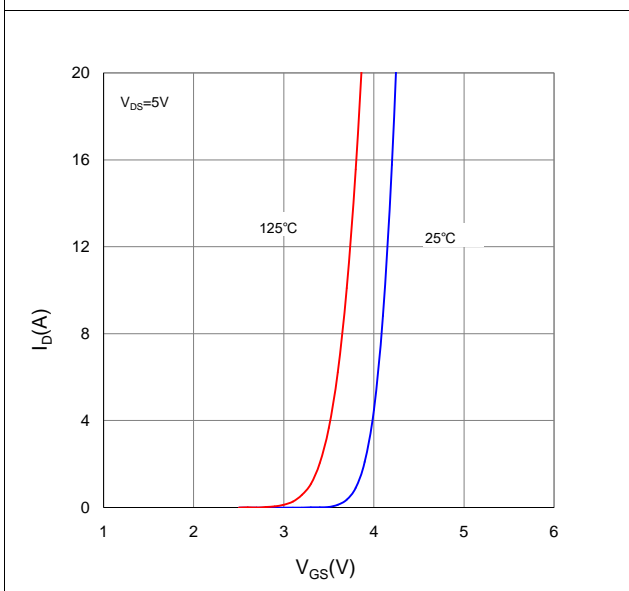


Figure 6. Typical Source-Drain Diode Forward Voltage

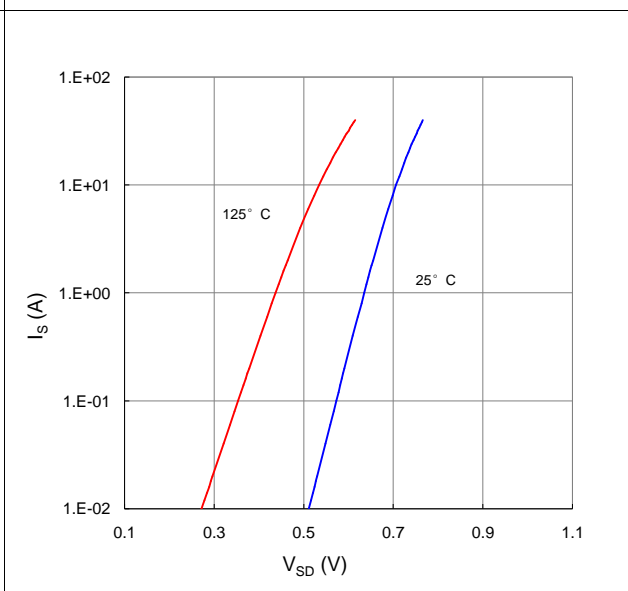


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

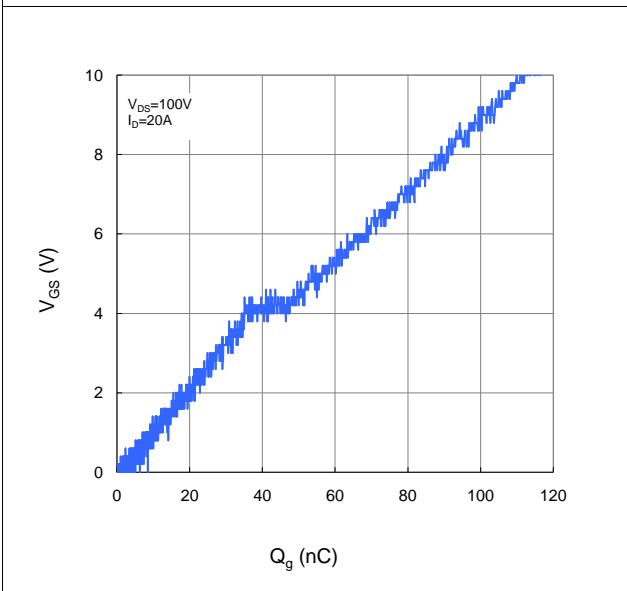


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

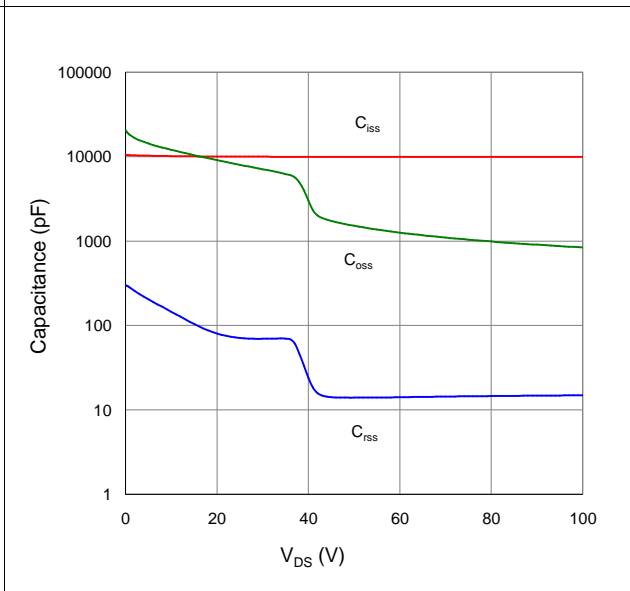


Figure 9. Maximum Safe Operating Area

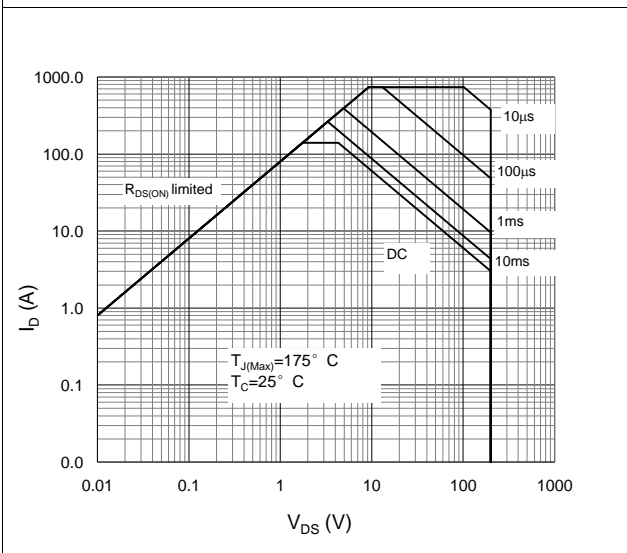


Figure 10. Maximum Drain Current vs. Case Temperature

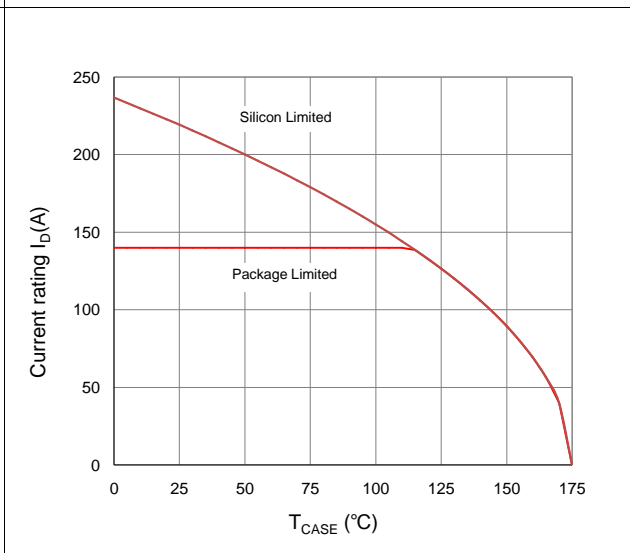
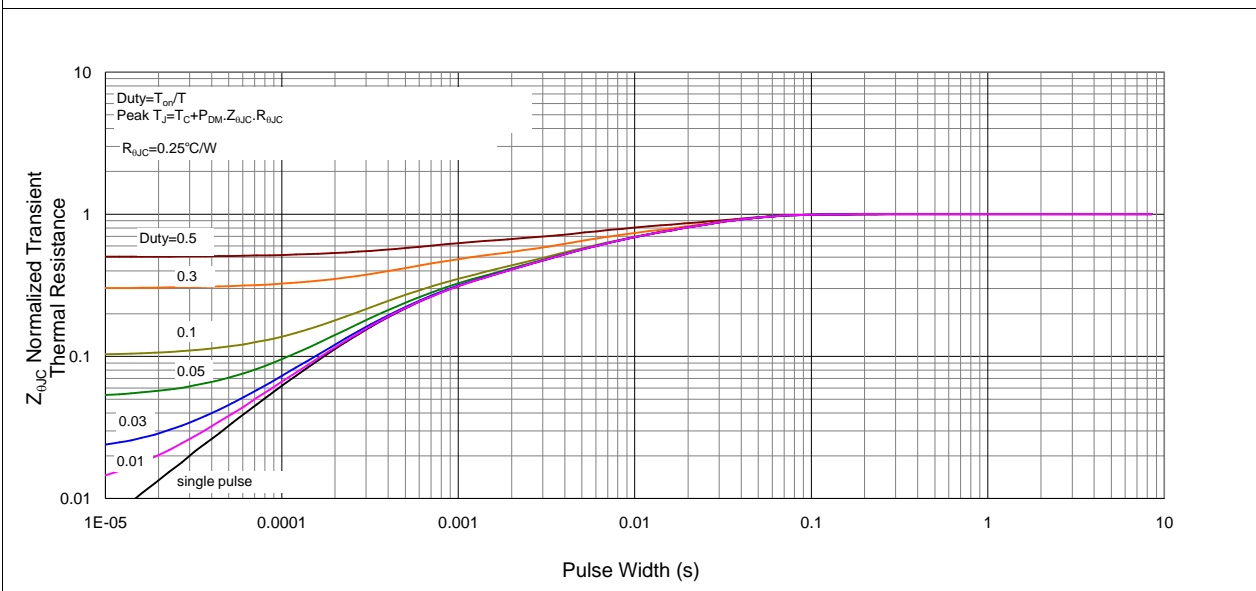
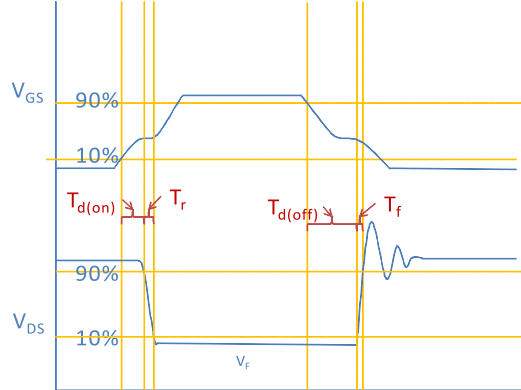
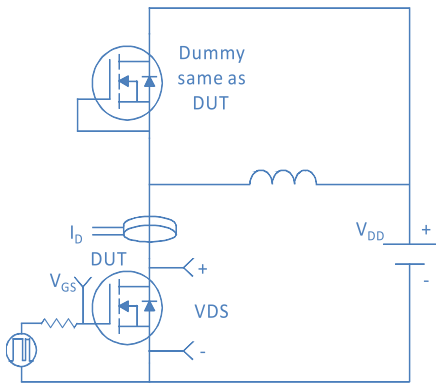


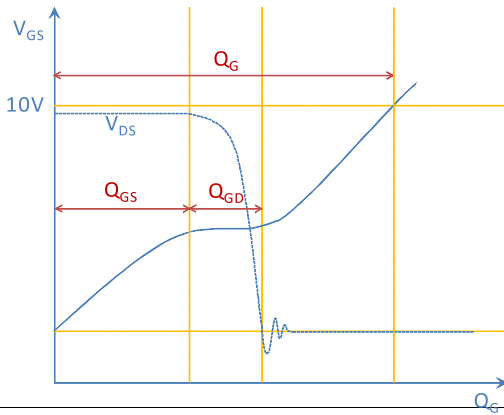
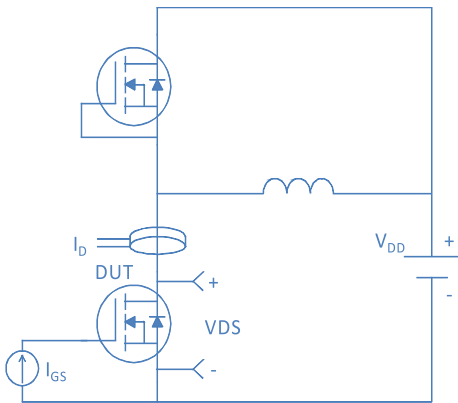
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



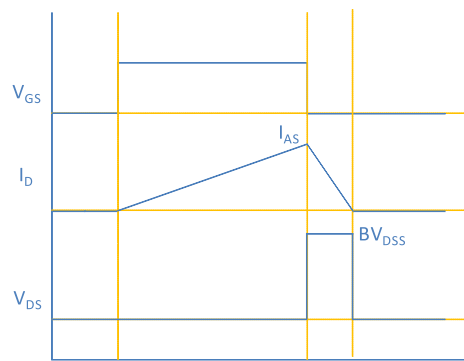
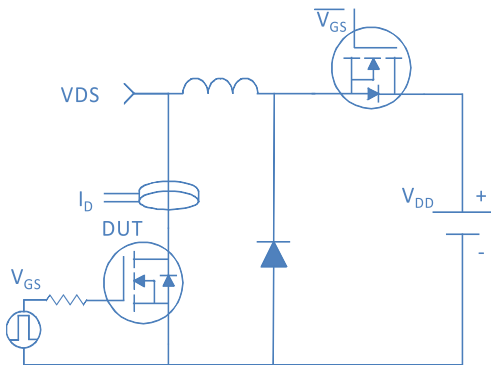
### Inductive switching Test



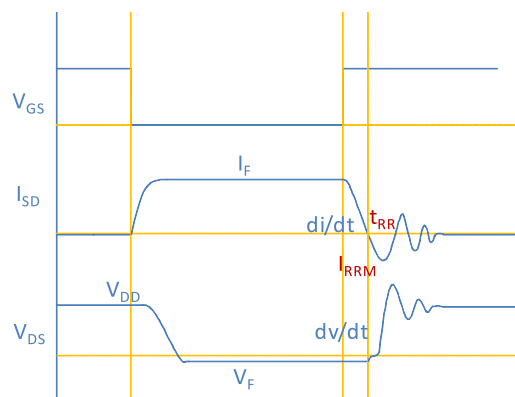
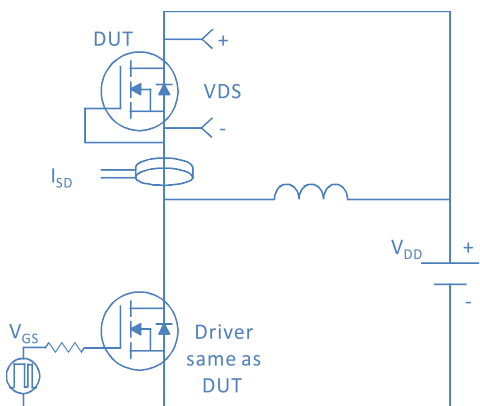
### Gate Charge Test



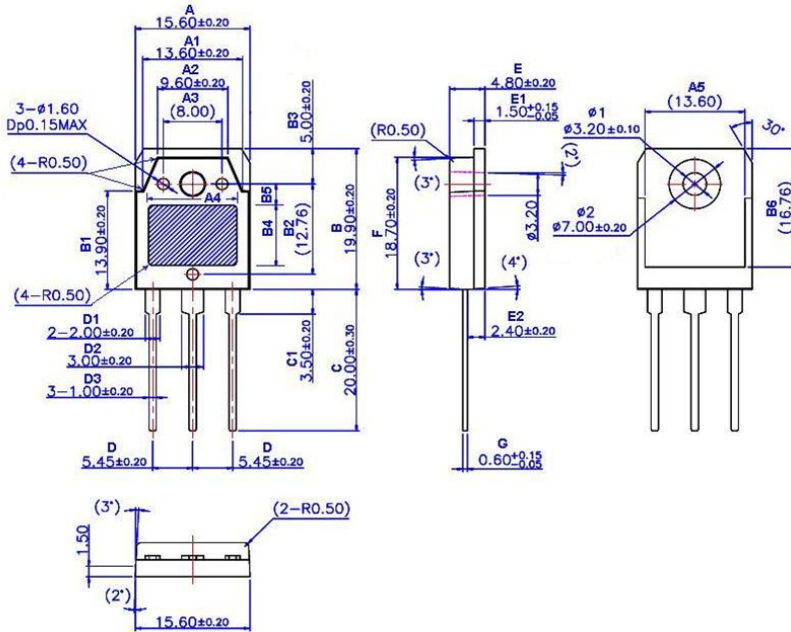
### Unclamped Inductive Switching (UIS) Test



### Diode Recovery Test



## TO-3P, 3 leads



(单位: mm)

符号	尺寸		符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max		Min	Max
A	15.40	15.80	B1	13.70	14.10	C1	3.30	3.70	E2	2.20	2.60
A1	13.40	13.80	B2	(12.76)		D	5.25	5.65	F	18.50	18.90
A2	9.40	9.80	B3	4.80	5.20	D1	1.80	2.20	G	0.55	0.75
A3	(8.00)		B4	(8.50)		D2	2.80	3.20	Φ1	3.10	3.30
A4	(12.00)		B5	(3.00)		D3	0.80	1.20	Φ2	6.80	7.20
A5	(13.60)		B6	(16.76)		E	4.60	5.00			
B	19.70	20.10	C	19.70	20.30	E1	1.45	1.65			