65V N-Ch Power MOSFET

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

V_{DS}		65	V
$R_{DS(on),typ}$	TO-263	3.9	mΩ
$R_{DS(on),typ}$	TO-220	4.2	mΩ
$I_{D\ (Sillicon\ Limited)}$		108	A

Application
◇ Synchronous Rectification in SMPS
◇ Hard Switching and High Speed Circuit
◇ DC/DC in Telecoms and Inductrial

TO-220   TO-263

Drain
Pin2

Gate
Pin 1

Src
Pin3
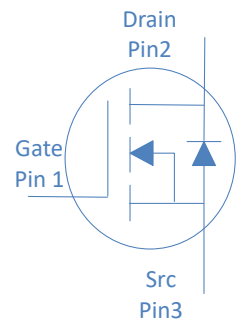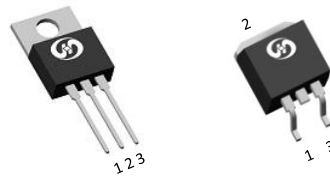
Part Number	Package	Marking
HGB046NE6A	TO-263	GB046NE6A
HGP046NE6A	TO-220	GP046NE6A

Absolute Maximum Ratings at T_j=25℃ (unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current (Silicon Limited)	I_D	T_C=25℃	108	A
		T_C=100℃	76	
Drain to Source Voltage	V_{DS}	-	65	V
Gate to Source Voltage	V_{GS}	-	±20	V
Pulsed Drain Current	I_{DM}	-	340	A
Avalanche Energy, Single Pulse	E_{AS}	L=0.1mH, T_C=25℃	31	mJ
Power Dissipation	P_D	T_C=25℃	107	W
Operating and Storage Temperature	T_J, T_{stg}	-	-55 to175	℃

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Ambient	$R_{θJA}$	60	℃/W
Thermal Resistance Junction-Case	$R_{θJC}$	1.4	℃/W

Electrical Characteristics at T_j=25℃ (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=250μA		65	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250μA		2.0	2.7	4.0	
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V, V_{DS}=60V, T_j=25℃		-	-	1	μA
		V_{GS}=0V, V_{DS}=60V, T_j=100℃		-	-	100	
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V		-	-	±100	nA
Drain to Source on Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=20A	TO-263	-	3.9	4.6	mΩ
Drain to Source on Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=20A	TO-220	-	4.2	4.9	mΩ
Transconductance	g_{fs}	V_{DS}=5V, I_D=20A		-	50	-	S
Gate Resistance	R_G	V_{GS}=0V, V_{DS} Open, f=1MHz		-	1.2	-	Ω

Dynamic Characteristics

Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=30V, f=1MHz	-	2373	-		pF
Output Capacitance	C_{oss}		-	769	-		
Reverse Transfer Capacitance	C_{rss}		-	45	-		
Total Gate Charge	Q_g(10V)	V_{DD}=30V, I_D=20A, V_{GS}=10V	-	41	-		nC
Gate to Source Charge	Q_{gs}		-	10	-		
Gate to Drain (Miller) Charge	Q_{gd}		-	10	-		
Turn on Delay Time	$t_{d(on)}$	V_{DD}=30V, I_D=20A, V_{GS}=10V, R_G=10Ω,	-	11	-		ns
Rise time	t_r		-	7	-		
Turn off Delay Time	$t_{d(off)}$		-	35	-		
Fall Time	t_f		-	9	-		

Reverse Diode Characteristics

Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_F=30A	-	0.9	1.2		V
Reverse Recovery Time	t_{rr}	V_R=30V, I_F=20A, dI_F/dt=400A/μs	-	35	-		ns
Reverse Recovery Charge	Q_{rr}		-	88	-		nC

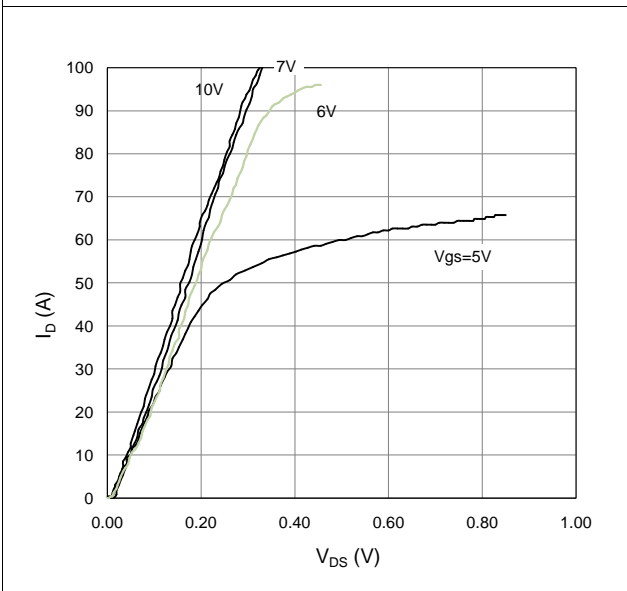**Hunteck**

Fig 1. Typical Output Characteristics

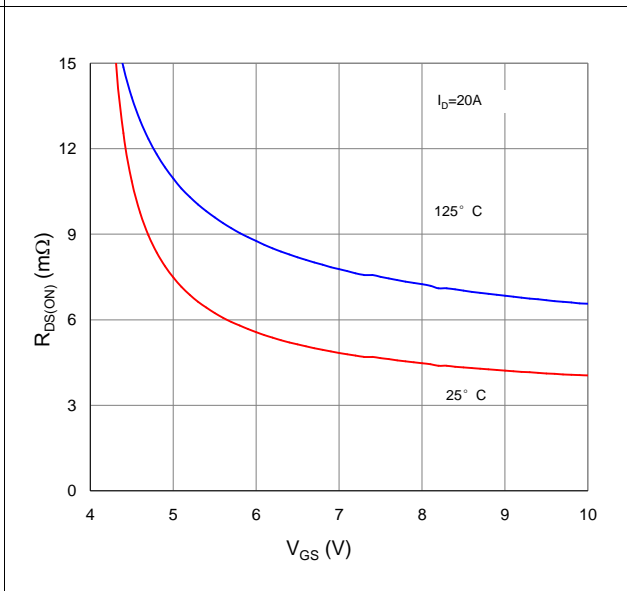Figure 2. On-Resistance vs. Gate-Source Voltage

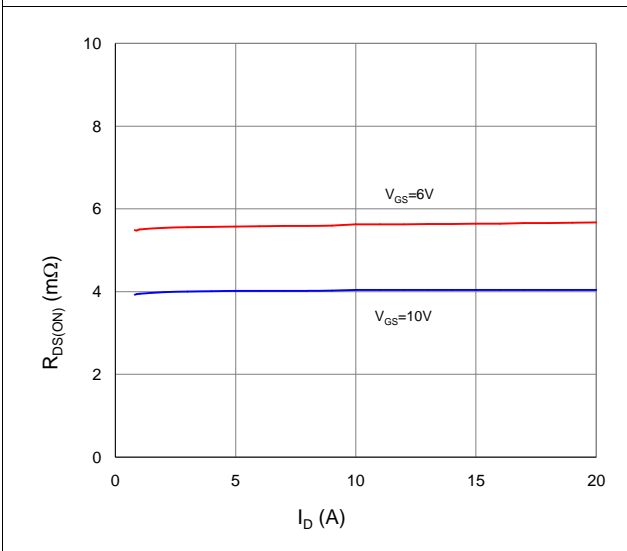Figure 3. On-Resistance vs. Drain Current and Gate Voltage

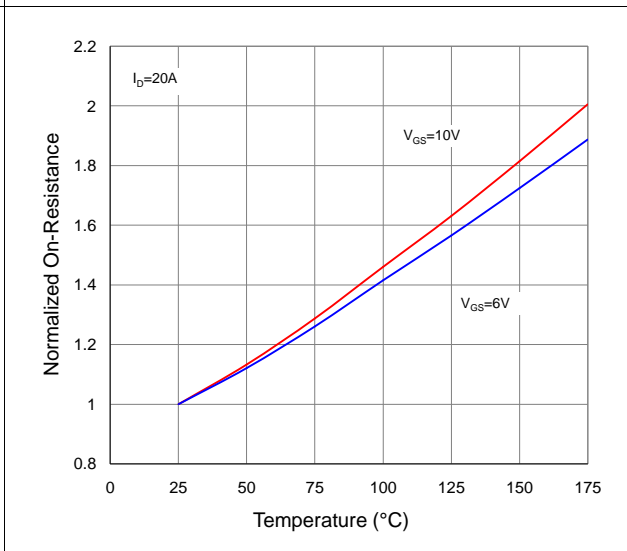Figure 4. Normalized On-Resistance vs. Junction Temperature
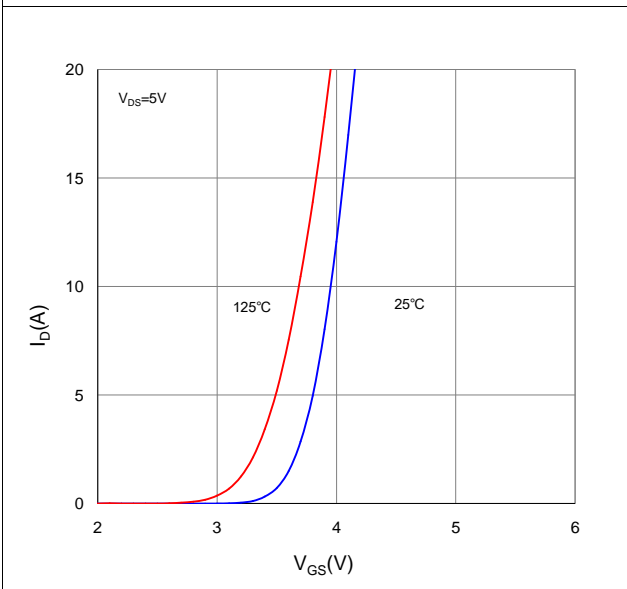

Figure 5. Typical Transfer Characteristics

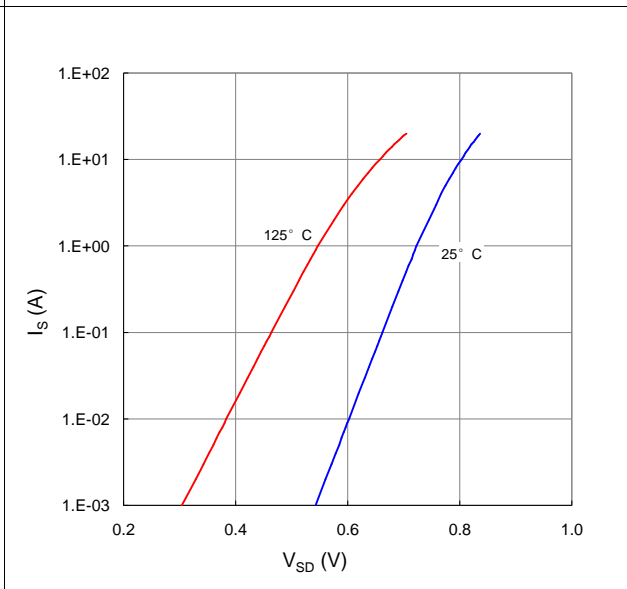
Figure 6. Typical Source-Drain Diode Forward Voltage

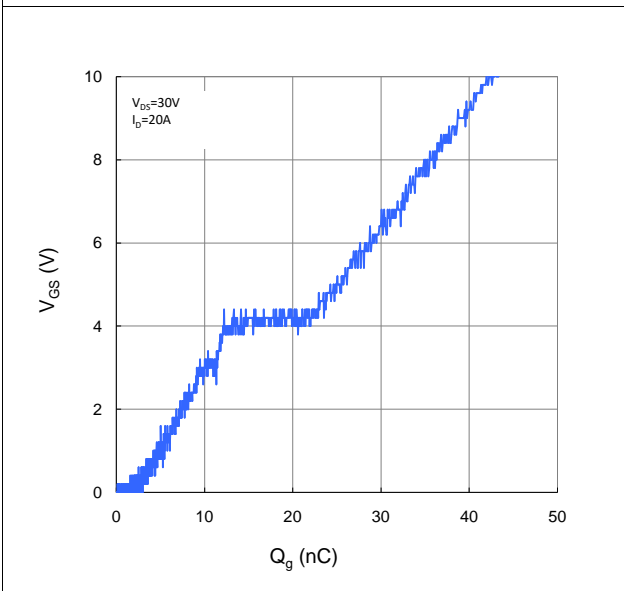Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

V_{DS}=30V
I_D=20A

V_{GS} (V)

Q_g (nC)

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

C_{iss}

C_{oss}

C_{rss}

Capacitance (pF)

V_{DS} (V)
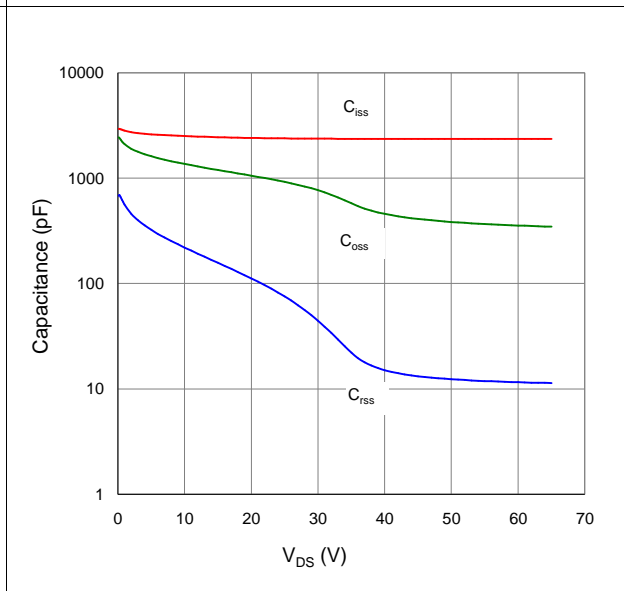
Figure 9. Maximum Safe Operating Area

$R_{DS(ON)}$ limited

10μs
100μs
1ms
10ms
10s
DC

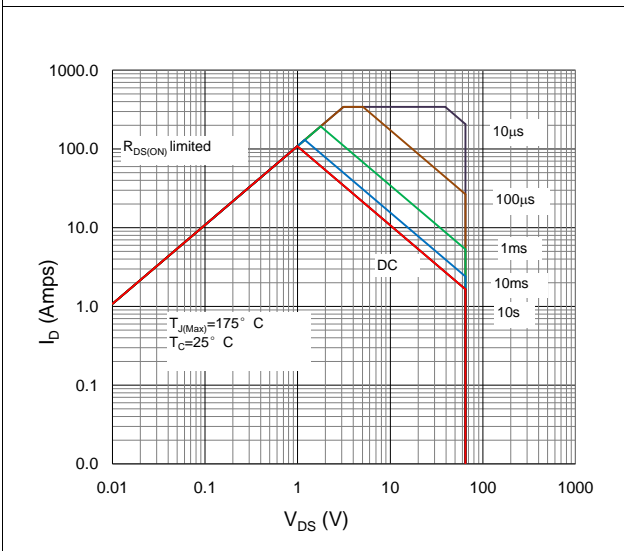$T_{J(Max)}$=175° C
T_C=25° C

I_D (Amps)

V_{DS} (V)

Figure 10. Maximun Drain Current vs. Case Temperature
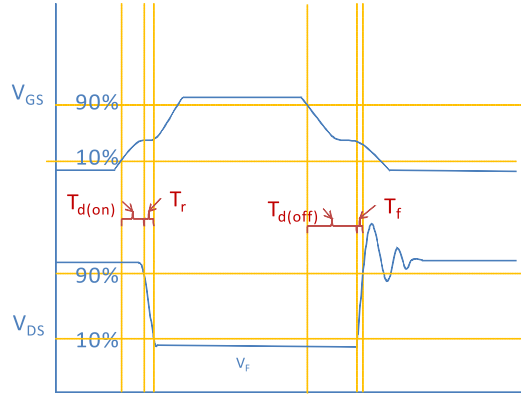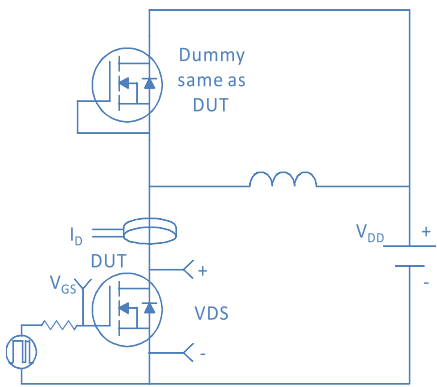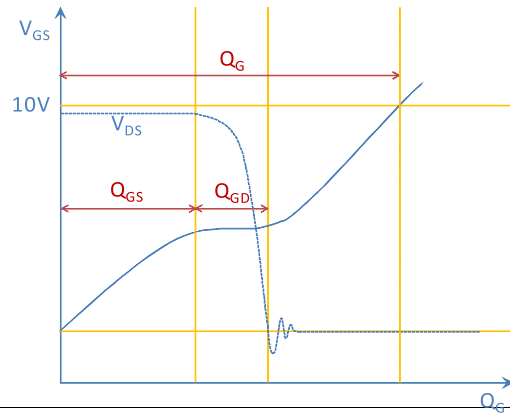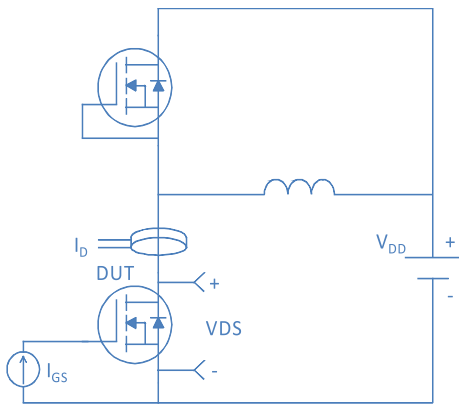
Current rating I_D(A)
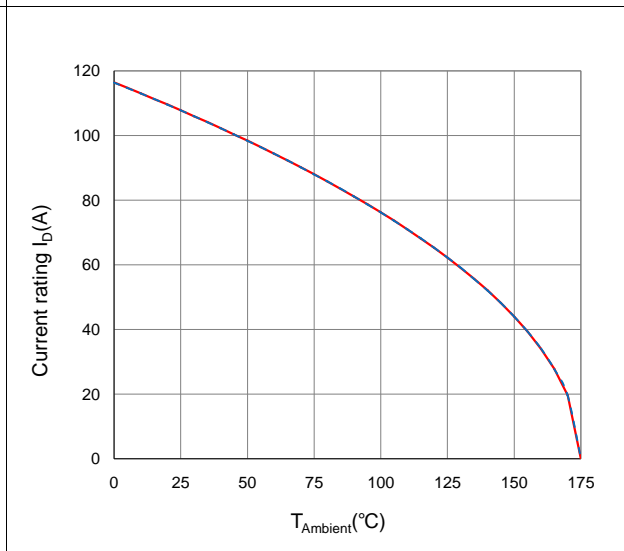
$T_{Ambient}$(°C)

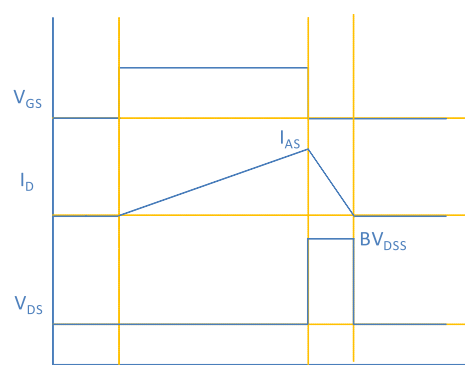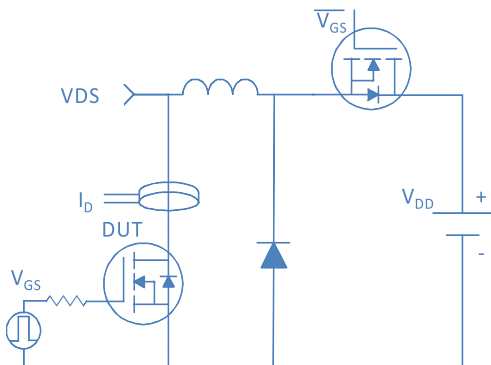Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient

0.03

Duty=T_{on}/T
Peak T_J=T_C+P_{DM}·$Z_{\theta JC}$·$R_{\theta JC}$

$R_{\theta JC}$=1.4°C/W

Duty=0.5
0.3
0.1
0.05
0.03
0.01

single pulse

$Z_{\theta JA}$ Normalized Transient Thermal Resistance

Pulse Width (s)

Ver 1.0

Nov. 2019

Inductive switching Test

V_{GS} 90% 10%

$T_{d(on)}$ T_r $T_{d(off)}$ T_f

V_{DS} 90% 10%

V_F

Gate Charge Test

V_{GS} 10V V_{DS} Q_G Q_{GS} Q_{GD} Q_G
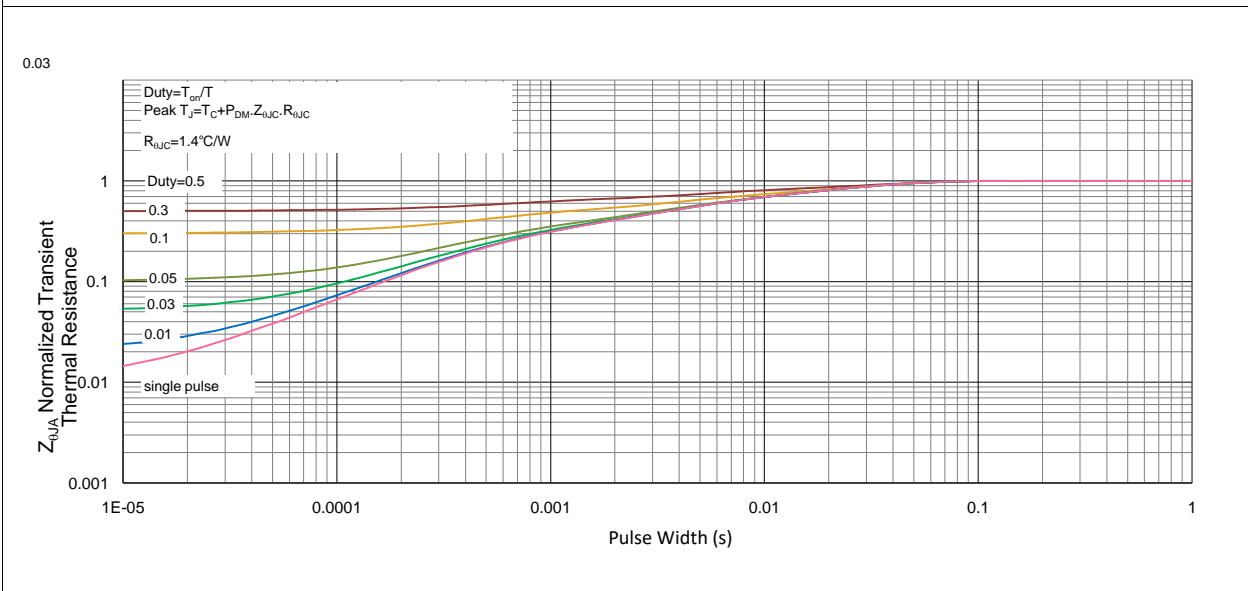
Uclamped Inductive Switching (UIS) Test

VDS $\overline{V_{GS}}$ I_D DUT V_{GS} V_{DD}

V_{GS} I_D I_{AS} BV_{DSS} V_{DS}

Diode Recovery Test

DUT VDS I_{SD} V_{DD} V_{GS} Driver same as DUT

V_{GS} I_{SD} I_F di/dt t_{RR} I_{RRM} V_{DS} V_{DD} dv/dt V_F
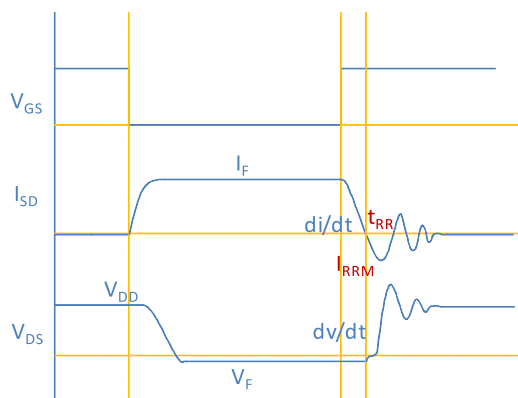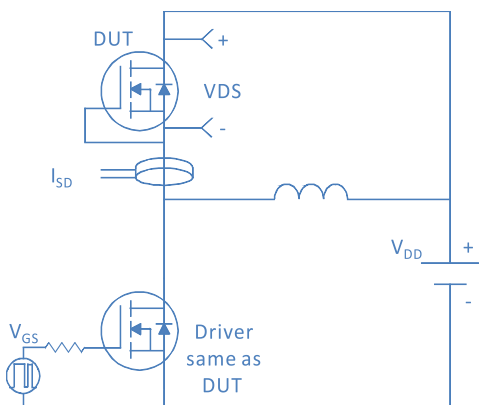
Package Outline

TO-220, 3 leads
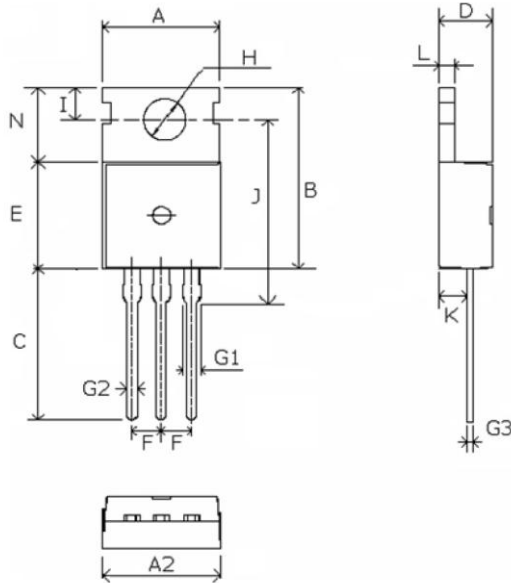
Dimentions in mm unless otherwise specified

Symbol	Min	Nom	Max
A	9.66	9.97	10.28
A2	9.80	10.00	10.20
B	15.60	15.70	15.80
C	12.70	13.48	14.27
D	4.30	4.50	4.70
E	9.00	9.20	9.40
F		2.54	
G1	1.32	1.52	1.72
G2	0.70	0.82	0.95
G3	0.45	0.52	0.60
H	3.50	3.60	3.70
I	2.70	2.80	2.90
J	15.70	15.97	16.25
K	2.20	2.40	2.60
L	1.15	1.27	1.40
N	6.40	6.60	6.80

TO-263, 3 leads
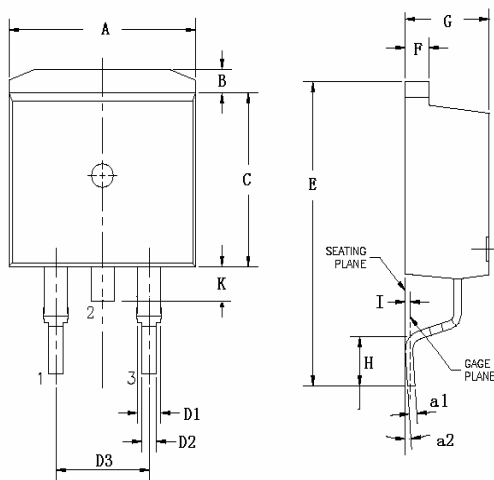
Dimentions in mm unless otherwise specified

Symbol	Min	Nom	Max
A	9.66	9.97	10.28
B	1.02	1.17	1.32
C	8.59	9.00	9.40
D1	1.14	1.27	1.40
D2	0.70	0.83	0.95
D3		5.08	
E	15.09	15.24	15.39
F	1.15	1.28	1.40
G	4.30	4.50	4.70
H	2.29	2.54	2.79
I		0.25	
K	1.30	1.45	1.60
a1	0.45	0.55	0.65
a2(degree)	0°		8°