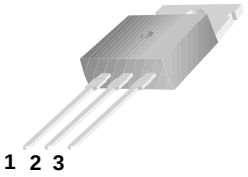
120N12

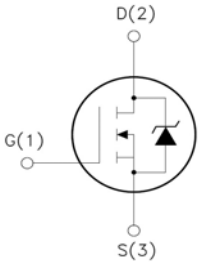
120V N-Channel MOSFET

Features:

- ☐ Low Intrinsic Capacitances.
- ☐ Excellent Switching Characteristics.
- ☐ Extended Safe Operating Area.
- ☐ Unrivalled Gate Charge :Qg=165 nC (Typ.).
- ☐ BVDSS=120V,I_D=120A
- ☐ R_{DS}(on) : 8.0mΩ (Max) @V_G=10V
- ☐ 100% Avalanche Tested

TO-220 RoHS COMPLIANT





1.Gate (G)
2.Drain (D)
3.Source (S)

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		120	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current	T_C=25°C	120	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	T_C=25°C	480	A
I_D	Continuous Drain Current	T_C=25°C	120	A
		T_C=100°C	90	
P_D	Maximum Power Dissipation	T_C=25°C	230	W
		T_C=100°C	139	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.55	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.0	
Avalanche Ratings				
E_{AS}	Avalanche Energy, Single Pulsed	L=0.5mH	600	mJ

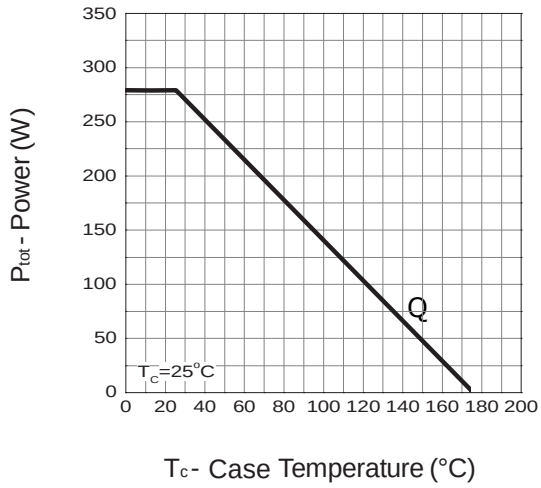
Note：* Repetitive rating ; pulse width limiited by junction temperature
** Drain current is limited by junction temperature
*** VD=90V

Electrical Characteristics (T_C = 25°C Unless Otherwise Noted)

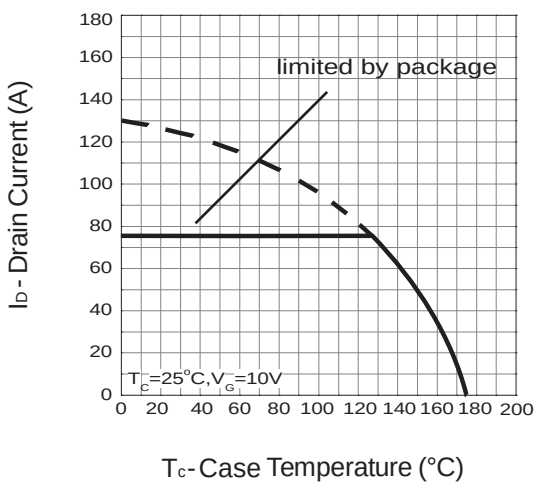
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	120	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=125V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	10	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	2.0	3.0	4.0	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$*	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=50A	-	6.2	8.0	mΩ
Diode Characteristics						
V_{SD}*	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V	-	0.85	1.35	V
t_{rr}	Reverse Recovery Time	I_{SD}=20A, dI_{SD}/dt=100A/μs	-	60	-	ns
Q_{rr}	Reverse Recovery Charge		-	560	-	nC
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.7	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=50V, Frequency=1.0MHz	-	9500	-	pF
C_{oss}	Output Capacitance		-	1467	-	
C_{rss}	Reverse Transfer Capacitance		-	62	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=50V, R_G= 2 . 5Ω, I_{DS} =20A, V_{GS}=10V,	-	62	-	ns
T_r	Turn-on Rise Time		-	73	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	87	-	
T_f	Turn-off Fall Time		-	41	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS}=100 V, V_{GS}=10V, I_{DS}=20A	-	165	-	nC
Q_{gs}	Gate-Source Charge		-	63	-	
Q_{gd}	Gate-Drain Charge		-	54	-	

Note * : Pulse test ; pulse width ≤300μs, duty cycle≤2%.

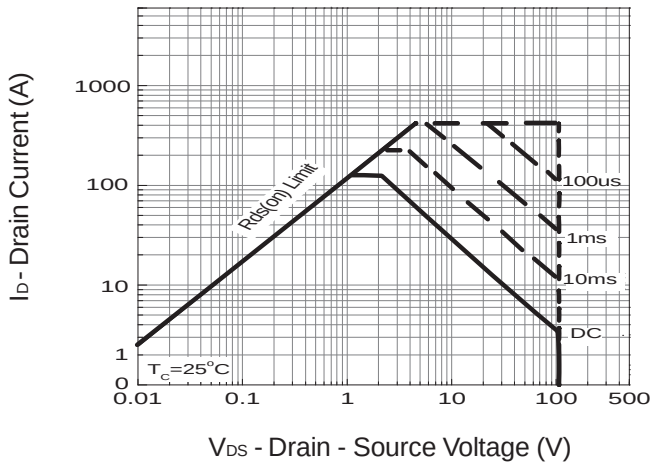
Power Dissipation



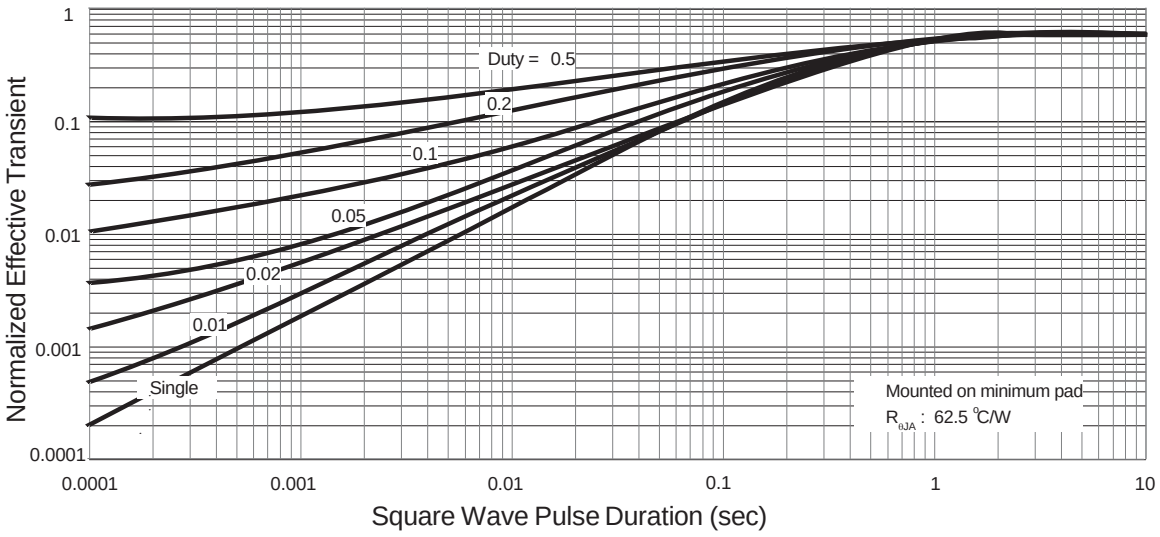
Drain Current



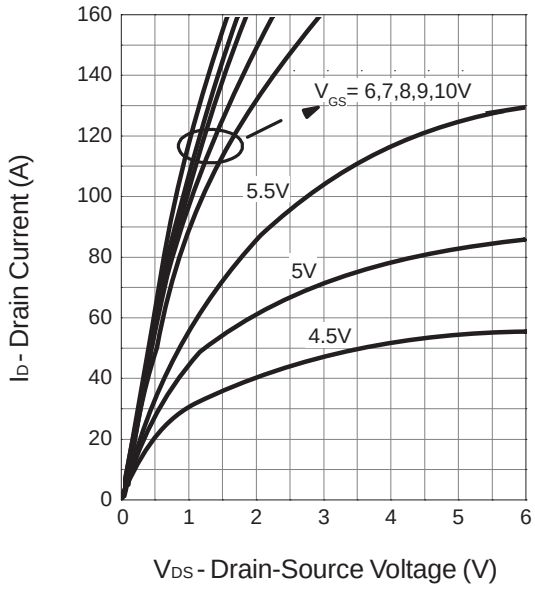
Safe Operation Area



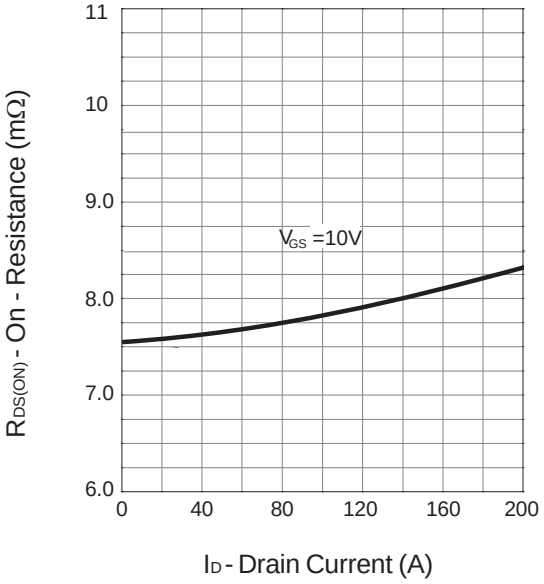
Thermal Transient Impedance



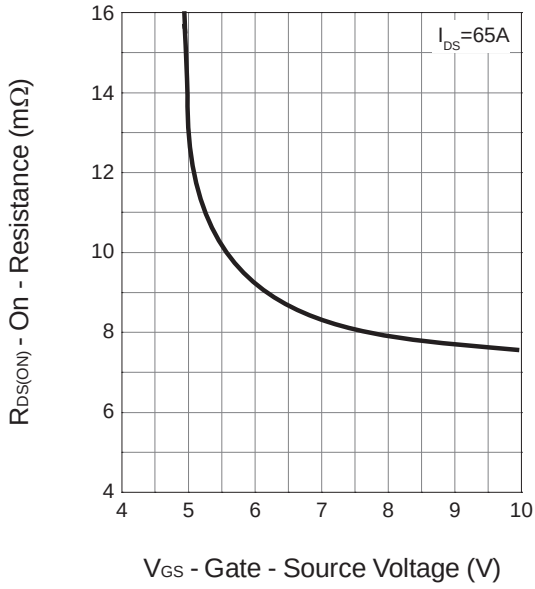
Output Characteristics



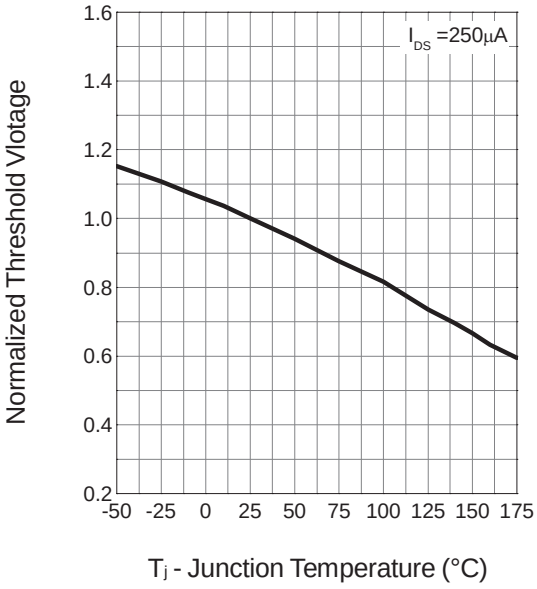
Drain-Source On Resistance



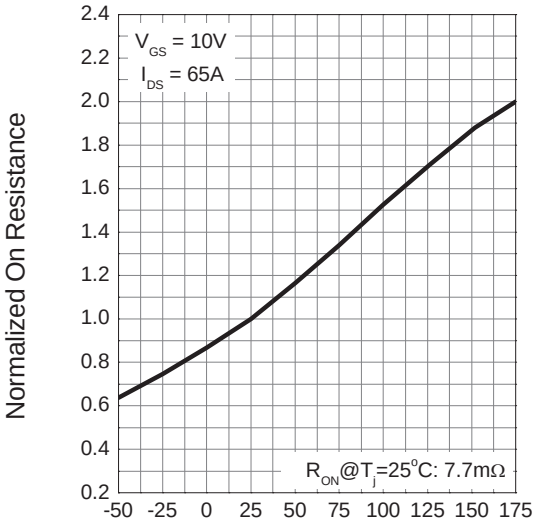
Drain-Source On Resistance



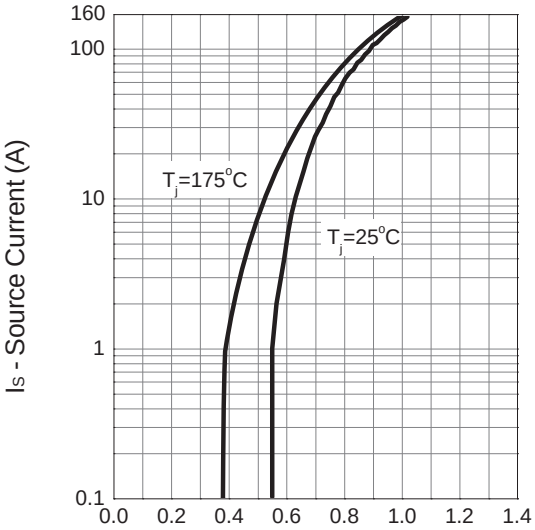
Gate Threshold Voltage



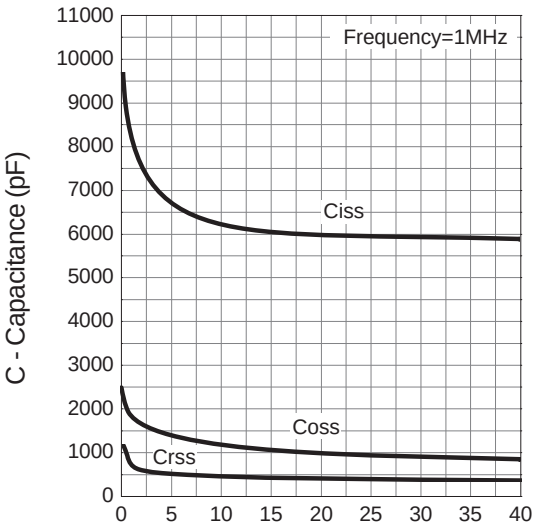
Drain-Source On Resistance



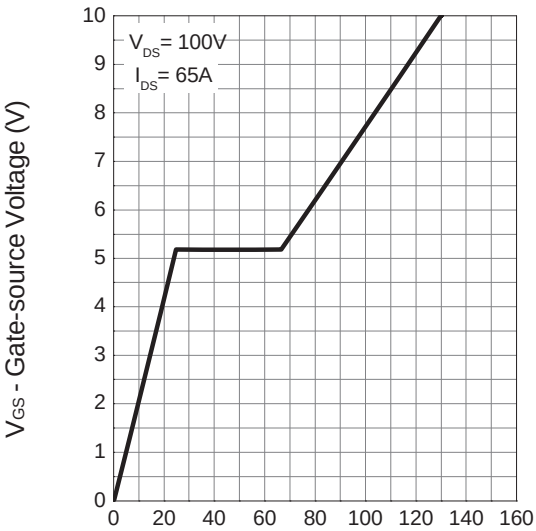
Source-Drain Diode Forward



Capacitance

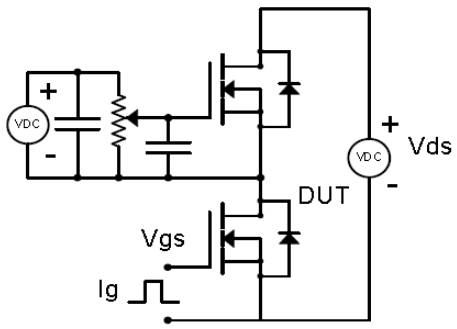


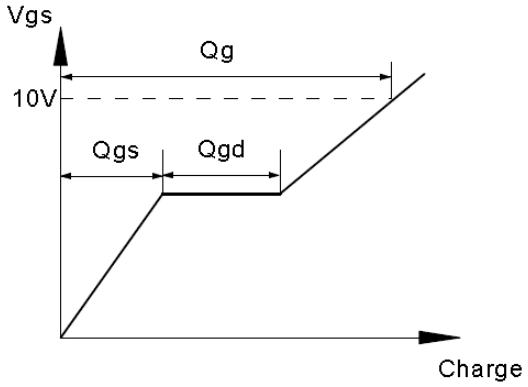
Gate Charge



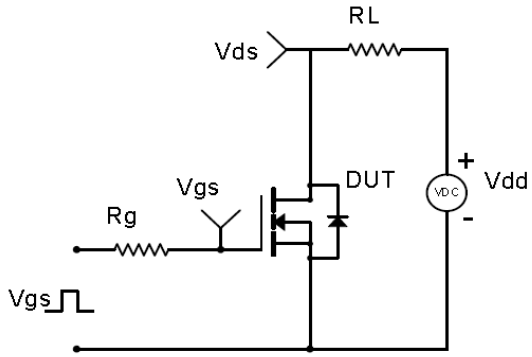
Avalanche Test Circuit

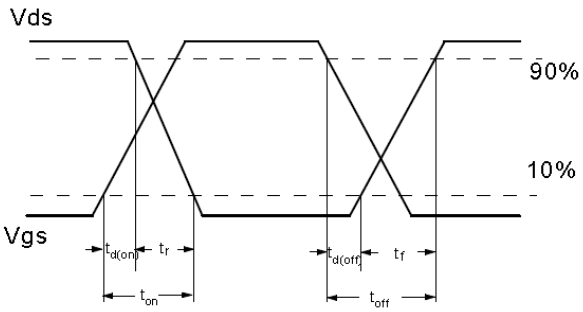
Gate Charge Test Circuit & Waveform



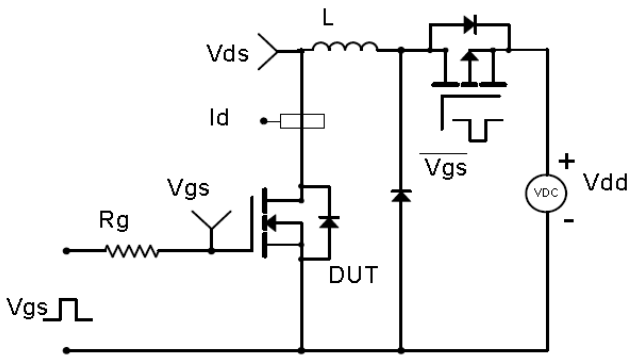


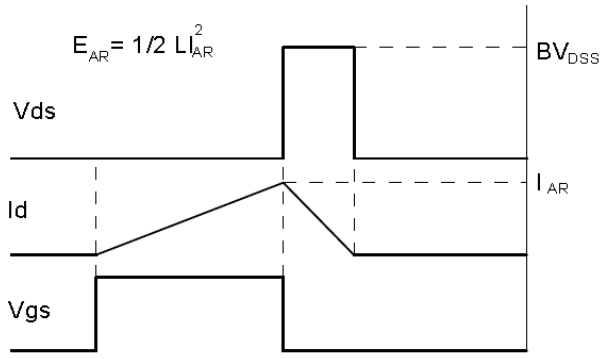
Resistive Switching Test Circuit & Waveforms





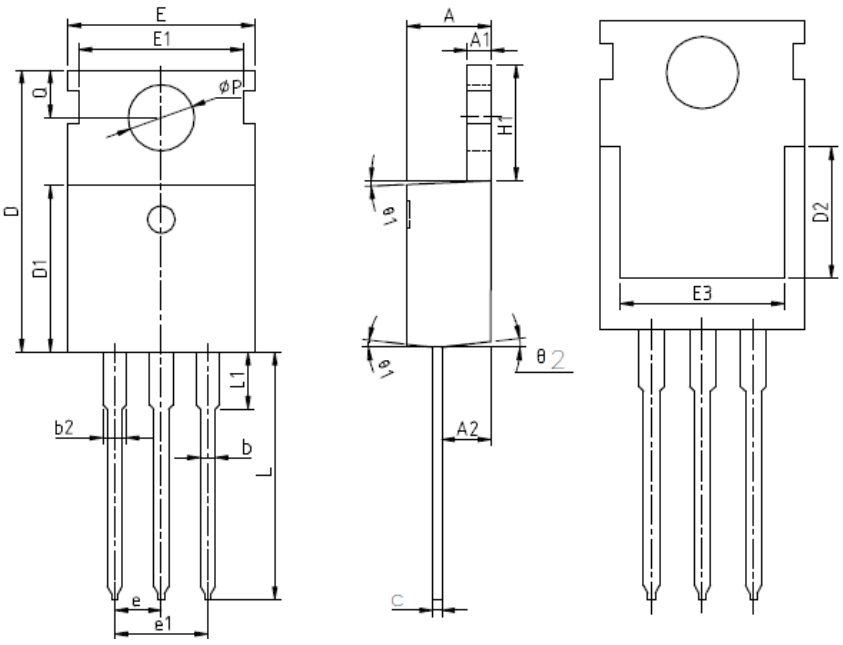
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Package Dimension

TO-220



SYMBOL	MIN	NOM	MAX
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b2	1.17	1.27	1.50
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	–	8.70	–
E2	9.65	10.00	10.35
E3	7.00	8.00	8.40
e		2.54 BSC	
e1		5.08 BSC	
H1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	–	3.10	3.40
ΦP	3.45	3.60	3.75
Q	2.60	2.80	3.00
θ1	4°	7°	10°
θ2	0°	3°	6°