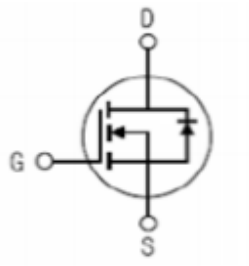
GD12N65
N-Channel MOSFET
650V, 12A, $R_{DS(ON)}$<0.75Ω



1.Gate 2. Drain 3. Source

TO-220

General Description and Features

- Superior Avalanche Rugged Technology
- Robust Gate Oxide Technology
- Excellent Switching Characteristics
- Low Gate Charge
- Extended Safe Operating Area
- Lower RDS(ON): 0.6Ω (Typical) @ VGS = 10V
- 100% Avalanche Tested
- Improved dv/dt Capability
- RoHS Compliant
- JEDEC Qualification

Absolute Maximum Ratings (Ta=25 ℃)

Symbol	Parameter		Value	Unit
BV_{DSS}	Drain-Source Voltage		650	V
BV_{GSS}	Gate-Source Voltage		±30	V
I_D	Drain Current continuous Tc=25℃		12	A
I_{DM}	Drain Current - pulse		48	A
P_D	Power Dissipation	Tc=25℃	51	W
		Derated above 25℃	0.4	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range		-55～+150	℃
T_L	Maximum Lead Temperature for Soldering		260	℃

Thermal Characteristics

Symbol	Parameter	TO-220	Unit
$R_{\theta JC}$	Thermal Resistance ,Junction to Case	0.83	℃/W
$R_{\theta JA}$	Thermal Resistance ,Junction to Ambient	62.5	℃/W

Electrical Characteristics(Tc=25℃ unless otherwise specified)

Symbol	Parameter	Test conditions	min	typ	max	unit
Off state characteristics						
BV_{DSS}	Drain to Source breakdown Voltage	I_D=250μA,V_{GS}=0V	650			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=650V,V_{GS}=0V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS}=±30V,V_{DS}=0V			±100	nA

On state characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	I_D=250μA,V_{GS}=V_{DS}	2.0		4.0	V
$R_{DS(on)}$	Drain to Source On-Resistance	I_D=6.0A,V_{GS}=10V		0.6	0.75	Ω
Gfs	Forward Transconductance	V_{DS}=15V,I_D= 6A		8.2		S
Dynamic characteristics						
C_{ISS}	Input Capacitance	V_{DS}=25V,V_{GS}=0V,f=1MHz		1480	1900	pF
C_{OSS}	Output Capacitance			200	270	pF
C_{RSS}	Reverse Transfer Capacitance			25	35	pF
Switching characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=325V,I_D=10A V_{GS}=10V,R_G=25Ω (Note1,2)		30	70	ns
t_r	Rise Time			115	240	ns
$t_{d(off)}$	Turn-Off Delay Time			95	200	ns
t_f	Fall Time			85	180	ns
Q_g	Total Gate Charge	V_{DD}=520V,I_D=12A V_{GS}=10V (Note1,2)		42	54	nC
Q_{gs}	Gate to Emitter Charge			8.6	—	nC
Q_{gd}	Gate to Collector Charge			21	—	nC
Source Drain Diode Characteristics						
Symbol	**Parameter**	**Test conditions**	**min**	**typ**	**max**	**unit**
I_S	Maximum Continuous Drain-Source Diode Forward Current				12	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				48	A
V_{SD}	Drain to Source Diode Forward Voltage	I_S=12A,V_{GS}=0V			1.4	V
t_{rr}	Diode Reverse Recovery Time	I_S=12A,V_{GS}=0V di/dt=100A/μS		380		nS
Q_{rr}	Diode Reverse Recovery Charge			3.5		μC

Note:
1.Pulse Test :Pulse Width≤300μs，Duty cycle≤2%
2.Essentially Independent of operating Temperature Typical Characteristics

Ratings and Characteristic Curves

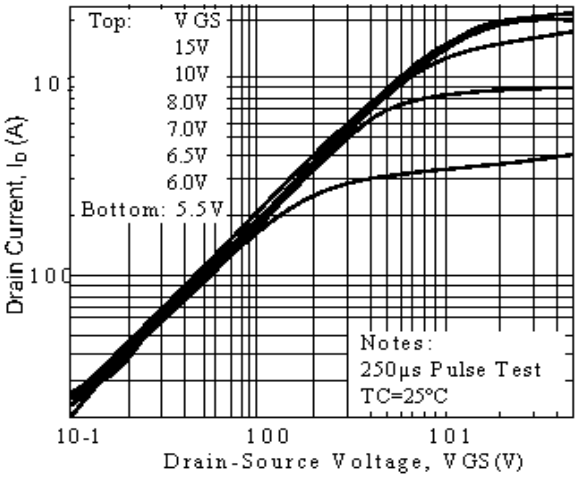


Fig.1 Output Characteristics

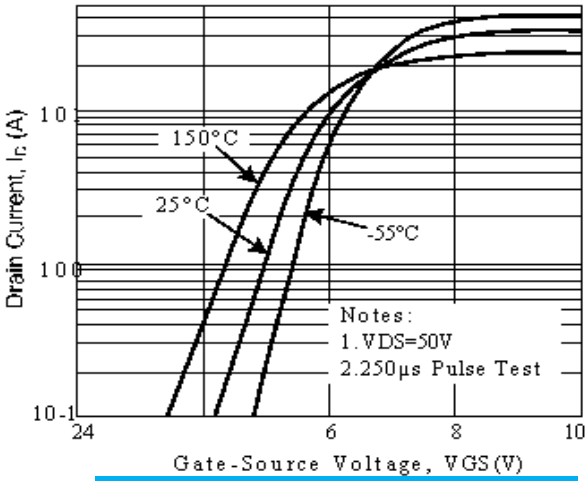


Fig.2 Transfer Characteristics

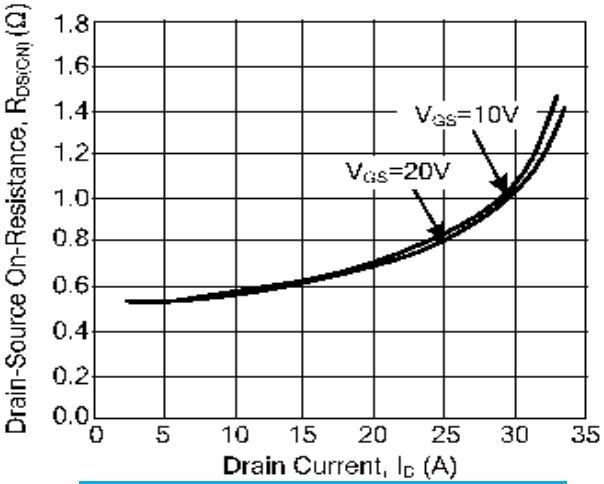


Fig.3 On-Resistance Variation vs. Drain Current and Gate Voltage

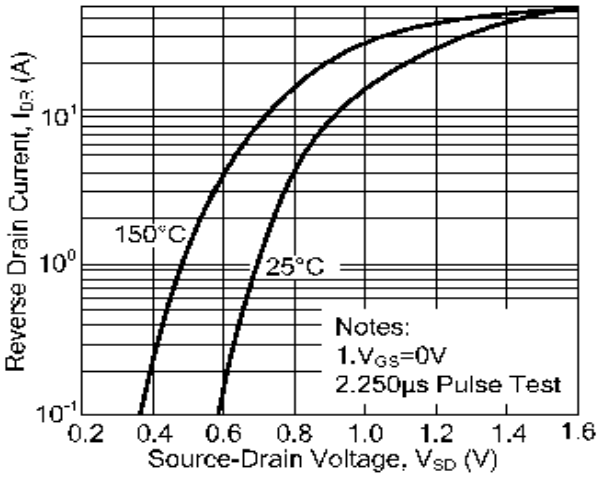


Fig.4 Body Diode Forward Voltage vs. Source Current and Temperature

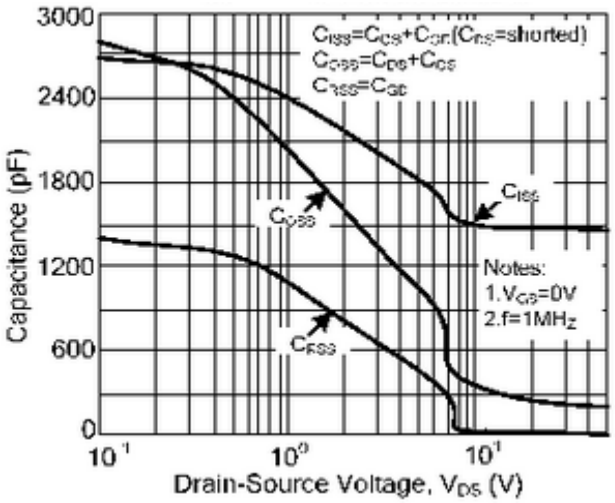


Fig.5 Capacitance Characteristics

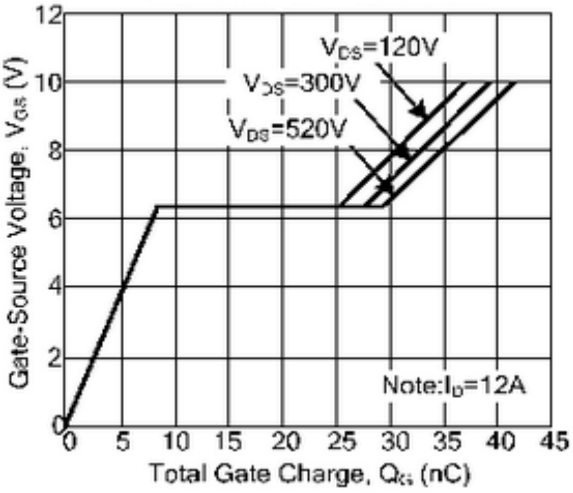


Fig.6 Gate Charge Characteristics

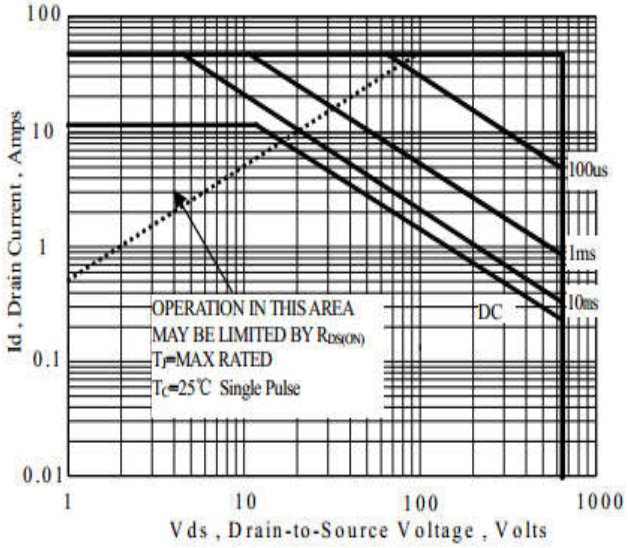


Fig.7 Maximum Safe Operating Area

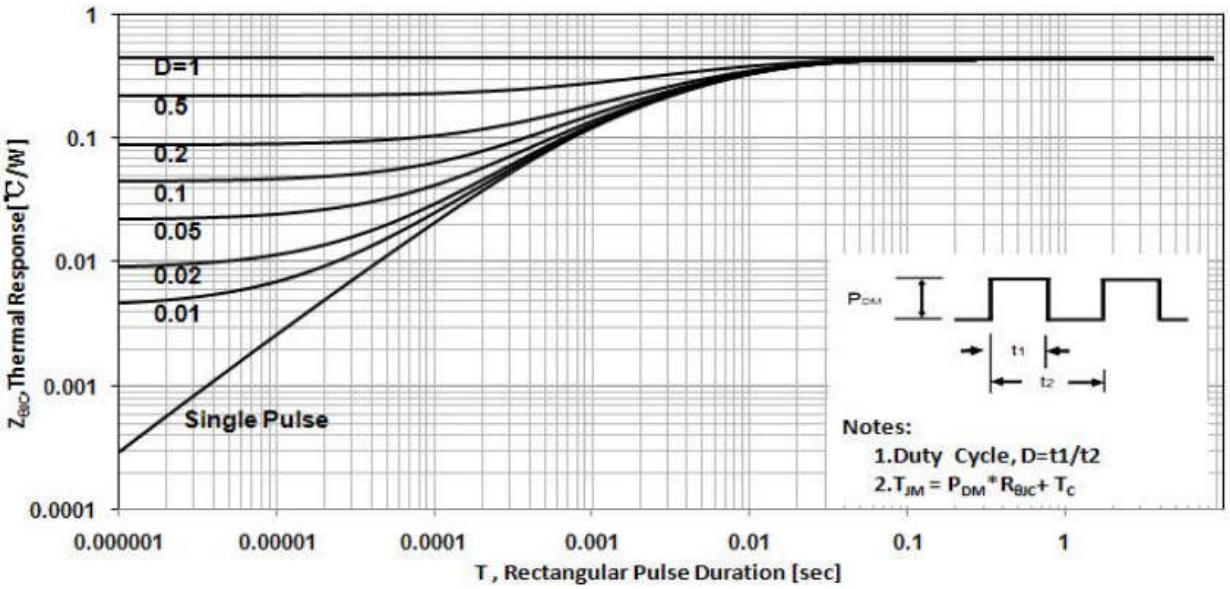
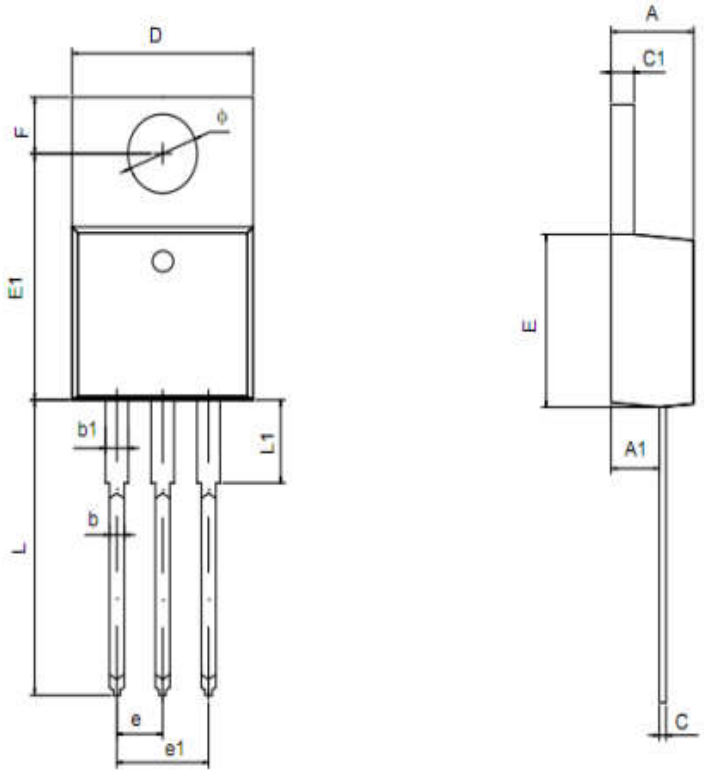


Fig.8 Transient Thermal Response Curve

TO-220 POD



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.420	4.720	1.174	0.186
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.360	0.460	0.014	0.018
c1	1.170	1.370	0.046	0.054
D	9.950	10.250	0.392	0.404
E	8.990	9.290	0.354	0.366
E1	12.550	12.850	0.494	0.506
e	2.540TYP		0.100TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
L	13.080	13.480	0.515	0.531
L1	2.470	2.870	0.097	0.113
ϕ	3.790	3.890	0.149	0.153