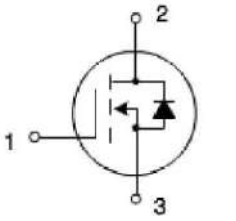
N-Channel MOSFET 650V, 7A,RDS(ON)<1.4



TO-251

TO-252

Features:

- Superior Avalanche Rugged Technology
- Robust Gate Oxide Technology
- Excellent Switching Characteristics
- Low Gate Charge
- Extended Safe Operating Area
- Lower RDS(ON): 1.13Ω (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℃		7	A
I_{DM}	Drain Current - pulse		28	A
P_D	Power Dissipation	Tc=25℃	57	W
		Derated above 25℃	0.37	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-220F	Unit
$R_{\theta JC}$	Thermal Resistance ,Junction to Case	2.55	℃/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,T_c=25℃			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 toSource On-Resistance	I_D=3.5A,V_{GS}=10V		1.13	1.6	Ω
Gfs	Forward Transconductance	V_{DS}=15V,I_D=3.5A		8		S
Dynamic characteristics						
C_{ISS}	Input Capacitance	V_{DS}=25V,V_{GS}=0V,f=1MHz		1200	1600	pF
C_{OSS}	Output Capacitance			100	150	pF
C_{RSS}	Reverse Transfer Capacitance			18	24	pF
Switching characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=325V,I_D=7A V_{GS}=10V,R_G=25Ω (Note1,2)		35	80	ns
t_r	Rise Time			79	165	ns
$t_{d(off)}$	Turn-Off Delay Time			80	160	ns
t_f	Fall Time			52	120	ns
Q_g	Total Gate Charge	V_{DD}=520V,I_D=7A V_{GS}=10V (Note1,2)		30	—	nC
Q_{gs}	Gate to Emitter Charge			6.5	—	nC
Q_{gd}	Gate to Collector Charge			13	—	nC
Source Drain Diode Characteristics						
Symbol	**Parameter**	**Test conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
I_S	Maximum Continuous Drain-Source Diode Forward Current				7	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				28	A
V_{SD}	Drain to Source Diode Forward Voltage	I_S=7A,V_{GS}=0V			1.4	V
t_{rr}	Diode Reverse Recovery Time	I_S=7A,V_{GS}=0V di/dt=100A/μS		320		nS
Q_{rr}	Diode Reverse Recovery Charge			2.4		μC

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

Ratings and Characteristic Curves

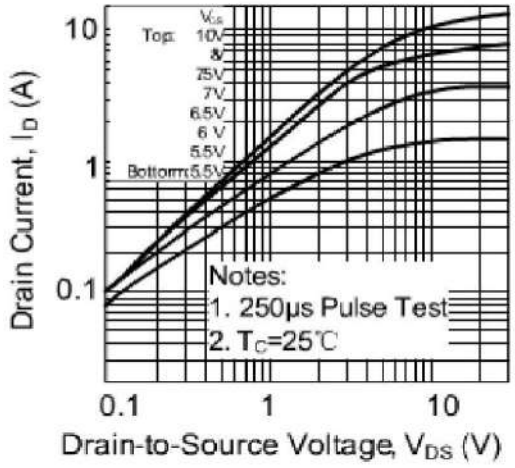


Fig.1 Output Characteristics

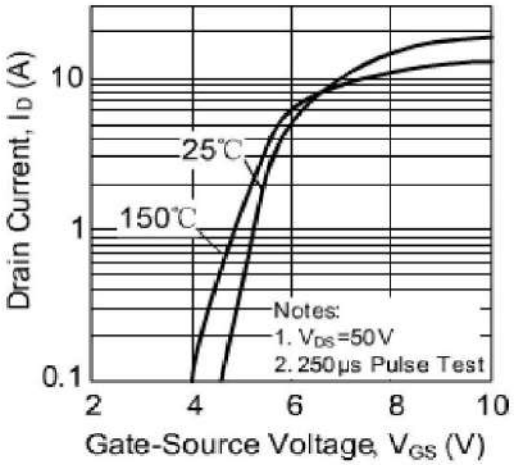


Fig.2 Transfer Characteristics

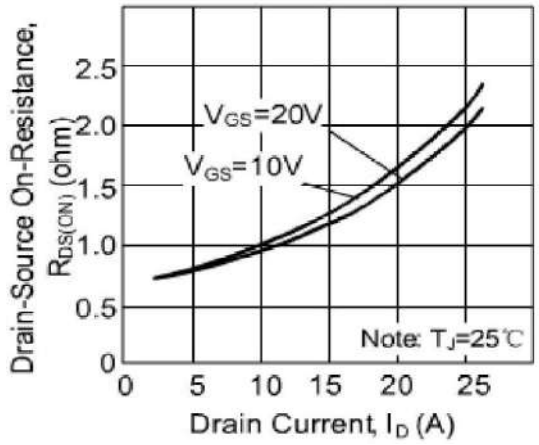


Fig.3 On-Resistance Variation vs. Drain Current and Gate Voltage

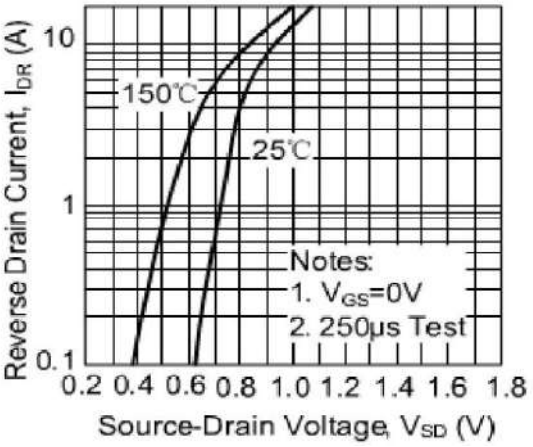


Fig.4 Body Diode Forward Voltage vs. Source Current and Temperature

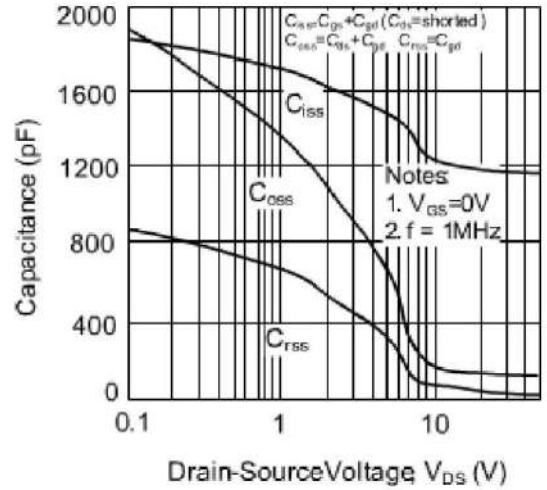


Fig.5 Capacitance Characteristics

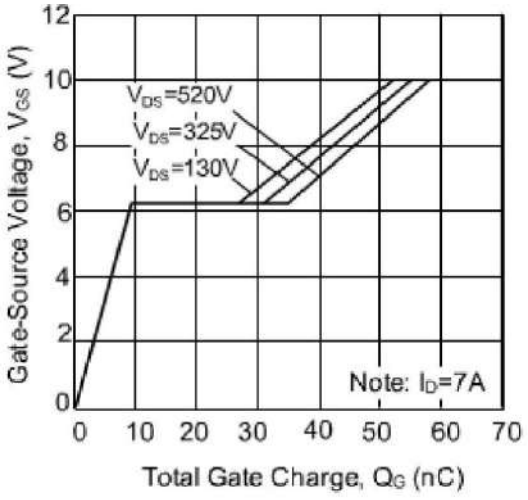


Fig.6 Gate Charge Characteristics

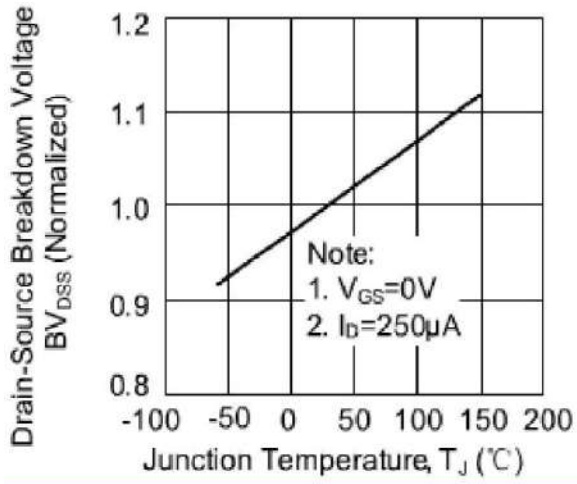


Fig.7 Breakdown Voltage Variation vs. Temperature

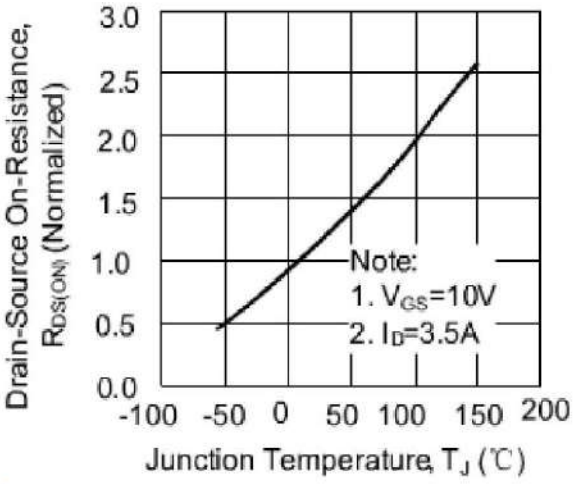


Fig.8 On-Resistance Variation vs. Temperature

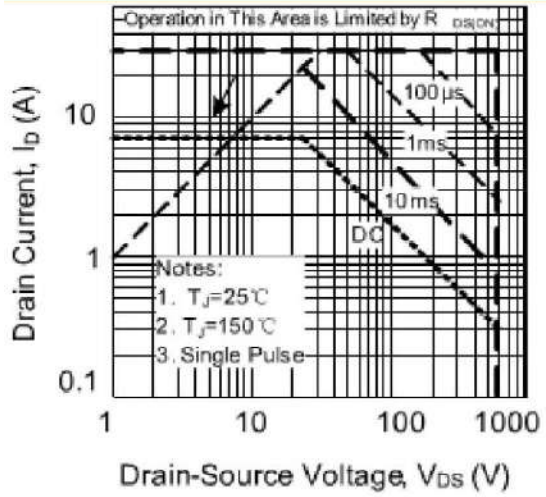


Fig.9 Maximum Safe Operating Area

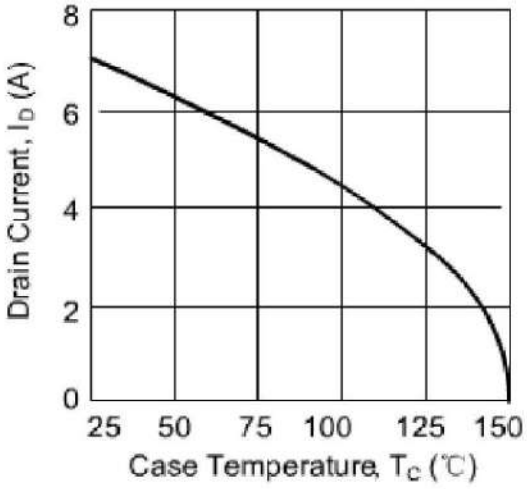


Fig.10 Maximum Drain Current vs.Case Temperature

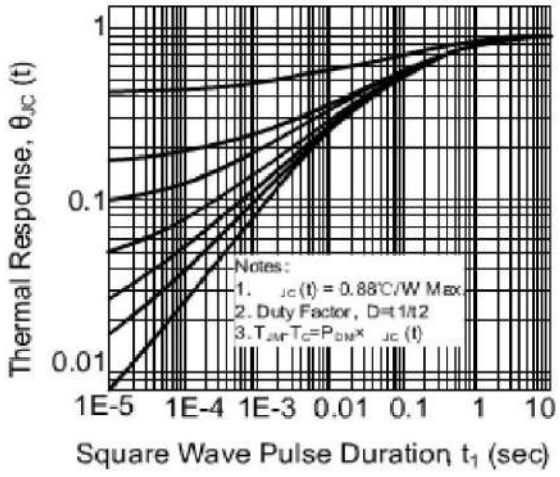


Fig.11 Transient Thermal Response Curve

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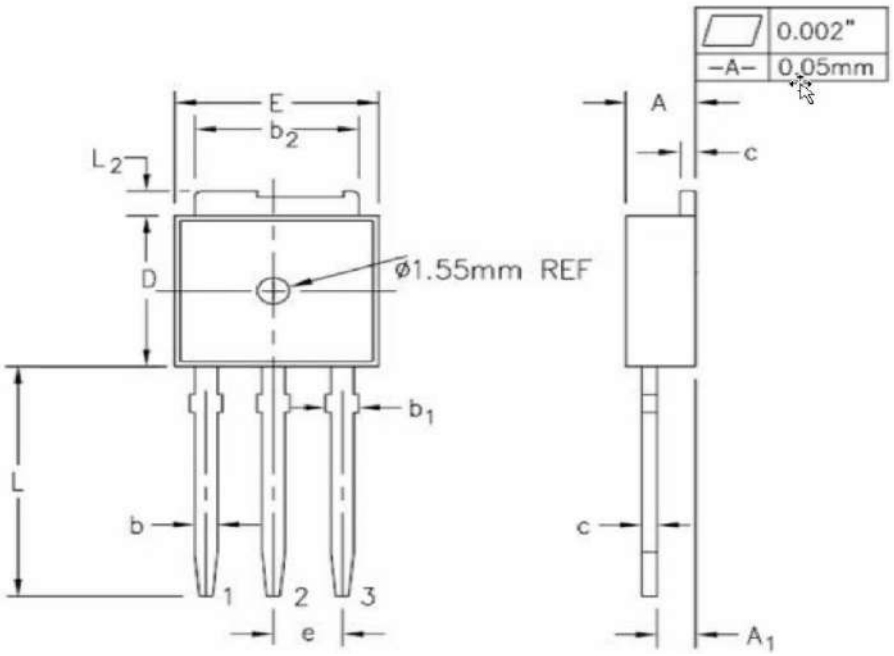
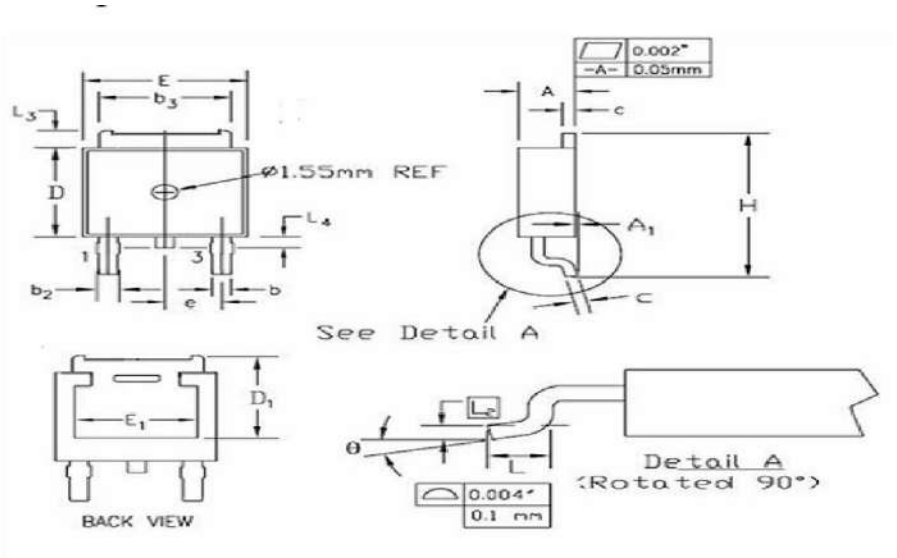


SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.086	0.094	2.19	2.38	
A1	0.041	0.048	1.04	1.23	
b	0.025	0.035	0.64	0.89	
b1	0.027	0.039	0.69	0.92	
b2	0.206	0.216	5.23	5.48	
c	0.018	0.024	0.46	0.61	
D	0.241	0.249	6.12	6.32	
E	0.250	0.265	6.35	6.73	
e	0.090 TYP.		2.28 TYP.		
L	0.350	0.380	8.89	9.65	
L2	0.035	0.050	0.89	1.27	

TO-252 POD



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.086	0.094	2.19	2.38	
A1	-	0.005	-	0.13	
b	0.025	0.035	0.64	0.89	
b2	0.033	0.045	0.84	1.14	
b3	0.205	0.215	5.21	5.46	
c	0.018	0.024	0.46	0.61	
D	0.241	0.249	6.12	6.32	
D1	0.205	-	5.21	-	
E	0.250	0.265	6.35	6.73	
E1	0.190	-	4.83	-	
e	0.090 BSC.		2.29 BSC.		
H	0.380	0.410	9.65	10.41	
L	0.055	0.070	1.40	1.78	
L2	0.020 BSC.		0.51 BSC.		
L3	0.035	0.050	0.89	1.27	
L4	0.025	0.040	0.64	1.01	
θ	0°	8°	0°	8°	