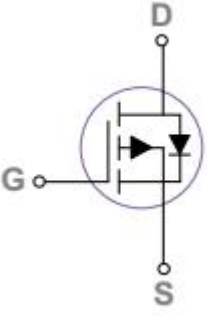
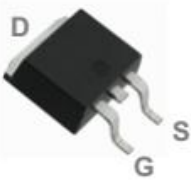


P-Channel Power MOSFET

General Features • $V_{DS} = -60V, I_D = -11A$ $R_{DS(ON)} < 180\ m\Omega @ V_{GS} = -10V$ $R_{DS(ON)} < 220\ m\Omega @ V_{GS} = -4.5V$ • Improved dv/dt capability • Fast switching • Good stability and uniformity with high EAS • Excellent package for good heat dissipation	 Schematic diagram
Applications • Power switching application • Hard switched and high frequency circuits • LED Lighting	 TO252 Pin Configuration

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous ($T_C = 25^\circ C$)	$I_D(25^\circ C)$	-11	A
Drain Current-Continuous ($T_C = 100^\circ C$)	$I_D(100^\circ C)$	-8	A
Pulsed Drain Current	I_{DM}	-28	A
Maximum Power Dissipation ($T_C = 25^\circ C$)	P_D	15.6	W
Derating factor		0.125	W/ $^\circ C$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-50 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	3.3	°C/W
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.2	-1.6	-2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D = -3A	-	153	180	mΩ
		V _{GS} =-4.5V, I _D =-1.5A		198	220	
Forward Transconductance	g _{FS}	V _{DS} =-10V, I _D =-2A	-	3	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-30V, V _{GS} =0V, F=1.0MHz	-	425	615	PF
Output Capacitance	C _{Oss}		-	35	50	PF
Reverse Transfer Capacitance	C _{rss}		-	20	30	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-30V, I _D =-1A V _{GS} =-10V, R _G =6Ω	-	5.2	10	nS
Turn-on Rise Time	t _r		-	19	36	nS
Turn-Off Delay Time	t _{d(off)}		-	35	67	nS
Turn-Off Fall Time	t _f		-	10.6	20	nS
Total Gate Charge	Q _g	V _{DS} =-30V, I _D =-3A, V _{GS} =-10V	-	8.2	12	nC
Gate-Source Charge	Q _{gs}		-	1.8	3.6	nC
Gate-Drain Charge	Q _{gd}		-	1.5	3	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-1A, T _J = 25°C	-		-1.0	V
Diode Forward Current (Note 2)	I _S	V _G =V _D =0V	-	-	-7	A
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics (Curves)

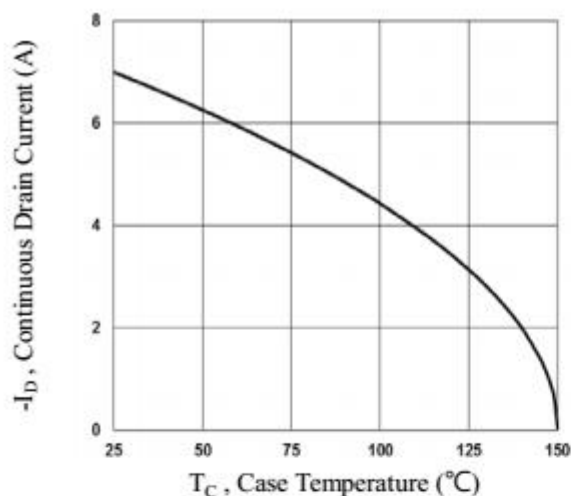


Fig.1 Continuous Drain Current vs. T_C

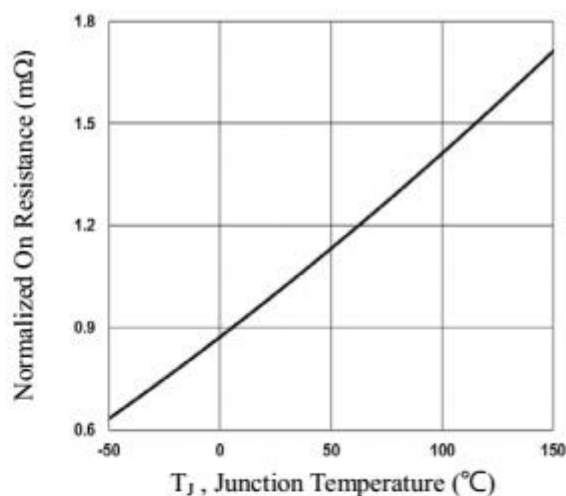


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

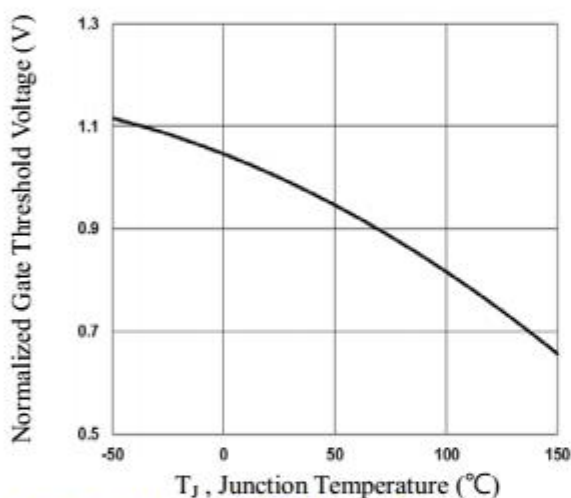


Fig.3 Normalized V_{th} vs. T_J

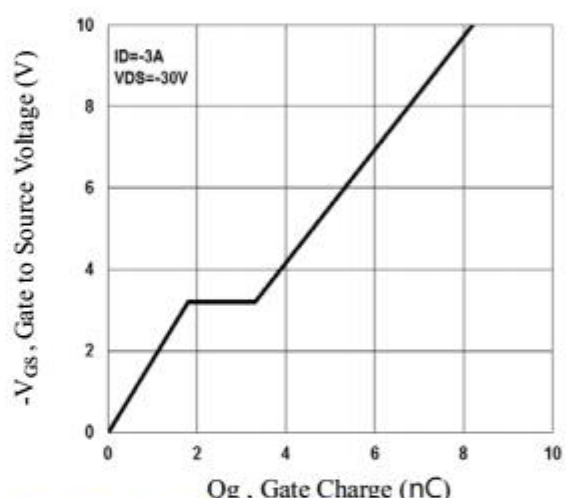


Fig.4 Gate Charge Waveform

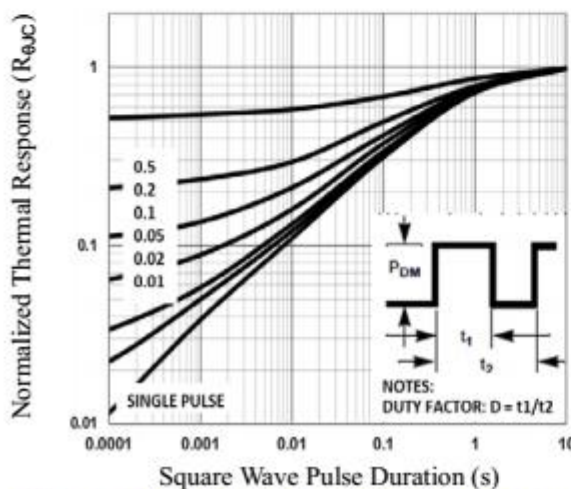


Fig.5 Normalized Transient Impedance

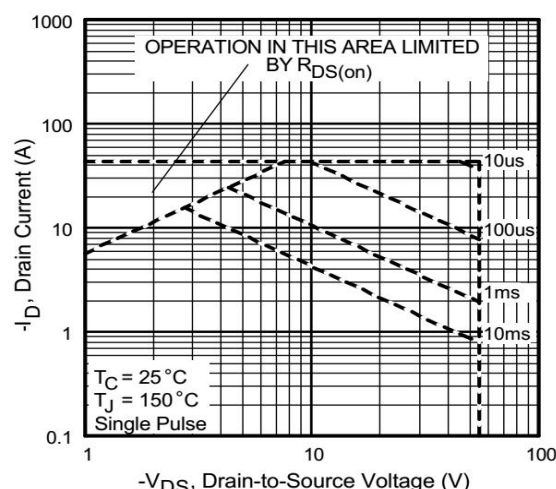


Fig.6 Maximum Safe Operation Area

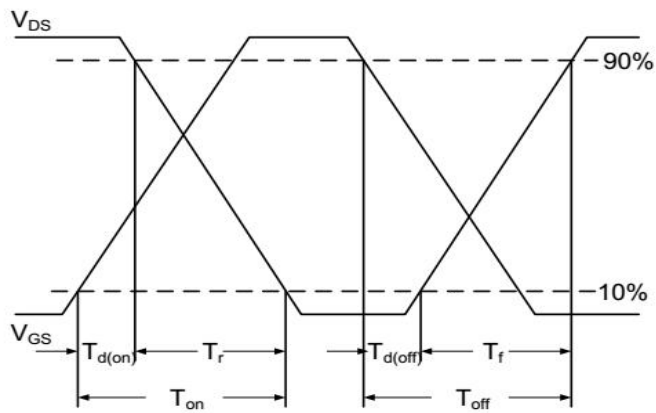


Fig.7 Switching Time Waveform

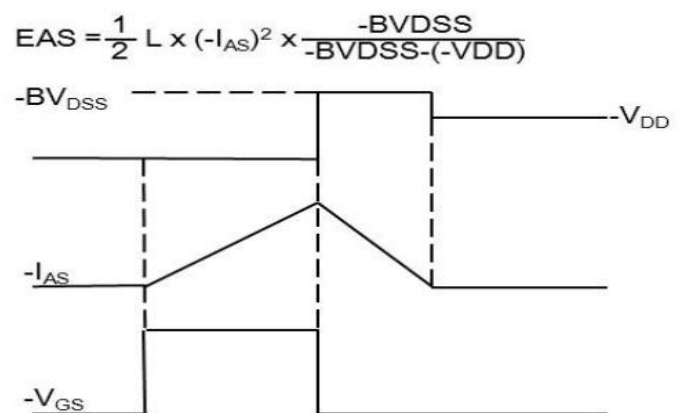
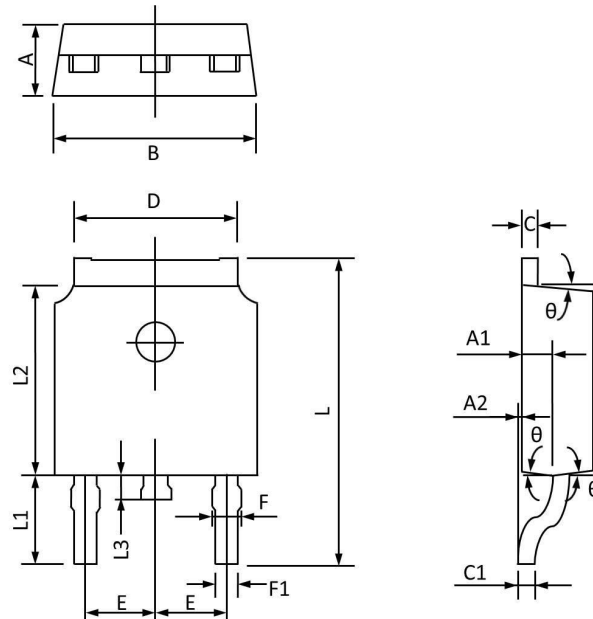


Fig.8 EAS Waveform

TO252 Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.80	10.40	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.00	6.20	0.236	0.244
L3	0.60	1.00	0.024	0.039
θ	3°	9°	3°	9°