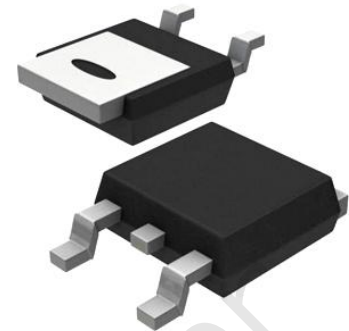


## Description:

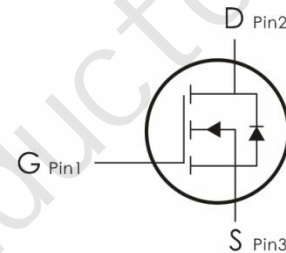
This N-Channel MOSFET uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge.

It can be used in a wide variety of applications.



## Features:

- 1)  $V_{DS}=60V, I_D=40A, R_{DS(ON)} < 20m\ \Omega @ V_{GS}=10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low  $R_{DS(ON)}$ .
- 5) Excellent package for good heat dissipation.



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current- $T_C=25^\circ C$	40	A
	Continuous Drain Current- $T_C=100^\circ C$	20	
$I_{DM}$	Drain Current - Pulsed1	100	A
$E_{AS}$	Single Pulse Avalanche Energy (note1)	24	mJ
$I_{AS}$	Avalanche Current (note2)	22	A
$P_D$	Power Dissipation	40	W
	Power Dissipation - Derate above $25^\circ C$	0.32	W/ $^\circ C$
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

**Thermal Characteristics:**

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.1	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62	

**Electrical Characteristics:** ( $T_c=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	60	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	0.07	---	V/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=650V$	---	---	1	$\mu\text{A}$
		$V_{GS}=0V, V_{DS}=480V, T_J=125^\circ\text{C}$	---	---	10	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	1.2	1.7	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS}=10V, I_D=15A$	---	20	25	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	---	26	35	m $\Omega$
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	---	1150	1700	pF
$C_{oss}$	Output Capacitance		---	60	90	
$C_{rss}$	Reverse Transfer Capacitance		---	43	65	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time <sup>2,3</sup>	$V_{DD}=30V, I_D=1A,$ $R_G=6\ \Omega$ (Note 3,4)	---	15	40	ns
$t_r$	Rise Time <sup>2,3</sup>		---	4.5	8	ns
$t_{d(off)}$	Turn-Off Delay Time <sup>2,3</sup>		---	27	50	ns

$t_f$	Fall Time <sup>2,3</sup>		---	7.5	13	ns
$Q_g$	Total Gate Charge <sup>2,3</sup>	$V_{GS}=30V, V_{DS}=10V,$ $I_D=20A(\text{Note } 3,4)$	---	16	20	nC
$Q_{gs}$	Gate-Source Charge <sup>2,3</sup>		---	2	4	nC
$Q_{gd}$	Gate-Drain "Miller" Charge <sup>2,3</sup>		---	3.5	7	nC
<b>Drain-Source Diode Characteristics</b>						
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=1A,$	---	---	1	V
$I_S$	Continuous Source Current	---	---	---	25	A
$I_{SM}$	Pulsed Source Current	---	---	---	100	A
$T_{rr}$	Reverse Recovery Time	$V_{GS}=0V, I_S=1A,$ $di/dt=100A/\mu s(\text{Note } 3)$	---	17	---	ns
$Q_{rr}$	Reverse Recovery Charge		---	12	---	nC

### Notes:

- 1.Repetitive Rating : Pulsed width limited by maximum junction temperature.
- 2.VDD=25V,VGS=10V,L=0.1mH,IAS=22A.,RG=25 ,Starting T<sub>J</sub>=25°C
- 3.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
- 4.Essentially independent of operating temperature.

### Typical Characteristics: (T<sub>c</sub>=25°C unless otherwise noted)

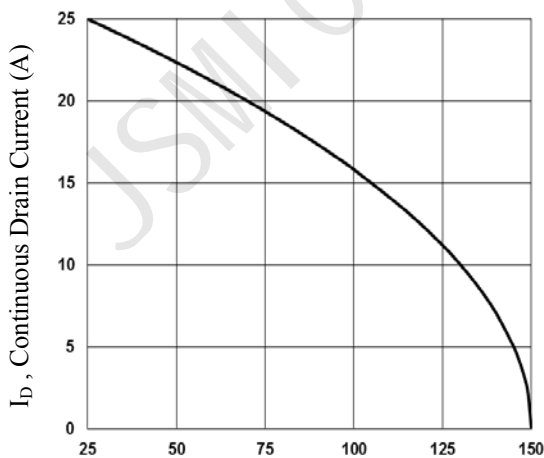


Fig.1 Continuous Drain Current vs. T<sub>c</sub>

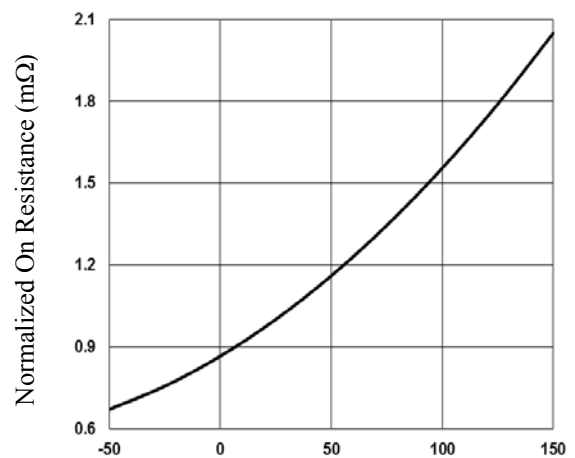


Fig.2 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>

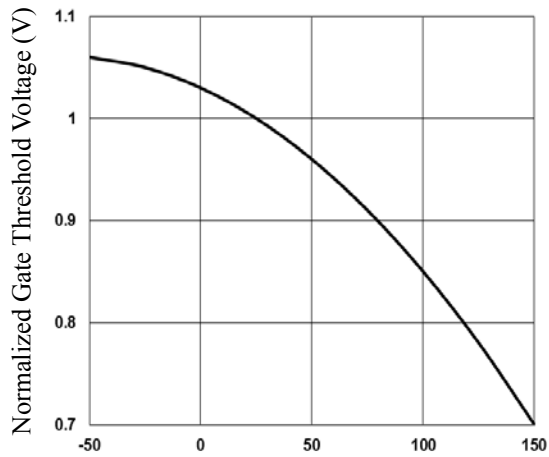
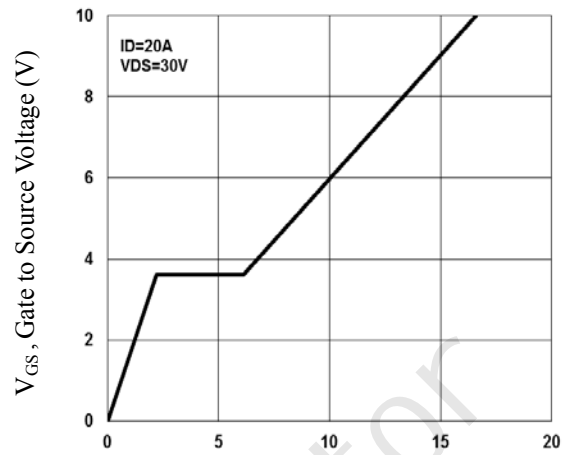

 Fig.3 Normalized V<sub>th</sub> vs. T<sub>j</sub>


Fig.4 Gate Charge Waveform

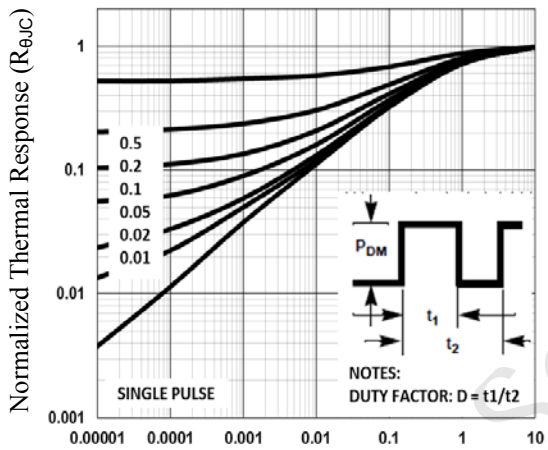


Fig.5 Normalized Transient Impedance

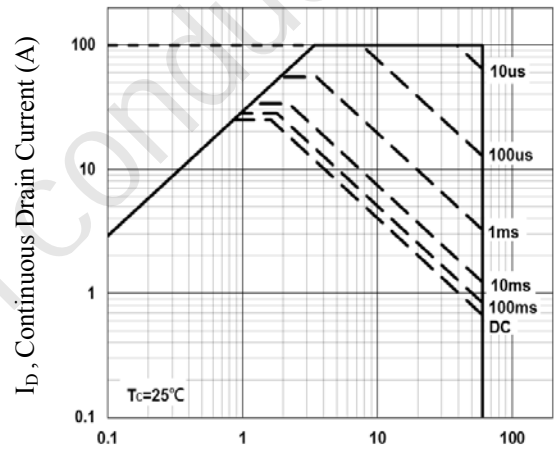


Fig.6 Maximum Safe Operation Area

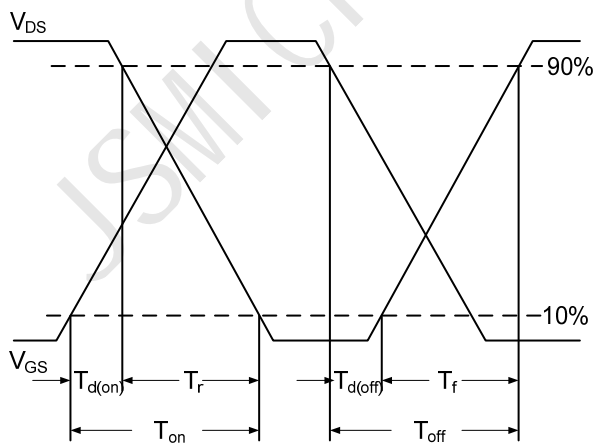


Fig.7 Switching Time Waveform

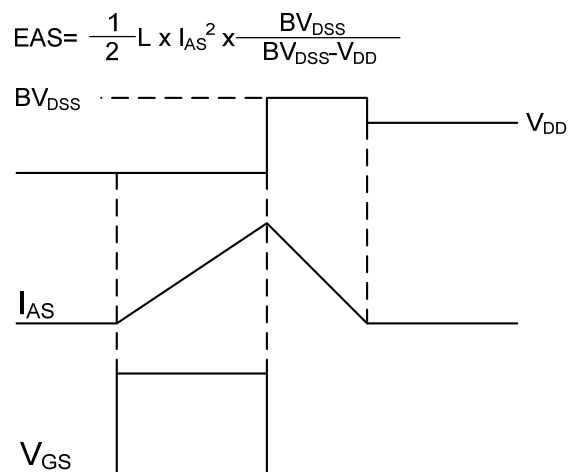
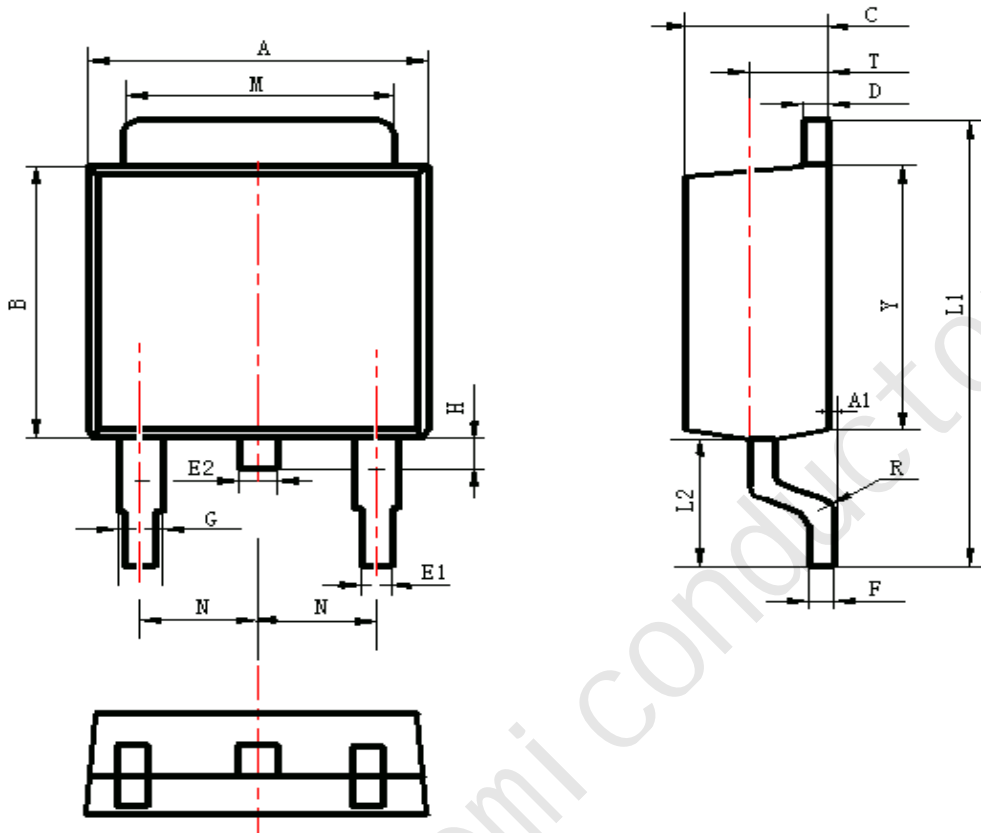


Fig.8 EAS Waveform

**Package Outline: TO-252**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	6.30	6.90	0.248	0.272
A1	0.00	0.16	0.000	0.006
B	5.70	6.30	0.224	0.248
C	2.10	2.50	0.083	0.098
D	0.30	0.70	0.012	0.028
E1	0.60	0.90	0.024	0.035
E2	0.70	1.00	0.028	0.039
F	0.30	0.60	0.012	0.024
G	0.70	1.20	0.028	0.047
L1	9.60	10.50	0.378	0.413
L2	2.70	3.10	0.106	0.122
H	0.40	1.00	0.016	0.039
M	5.10	5.50	0.201	0.217
N	2.09	2.49	0.082	0.098
R	0.30		0.012	
T	1.40	1.60	0.055	0.063
Y	5.10	6.30	0.201	0.248