

General Description

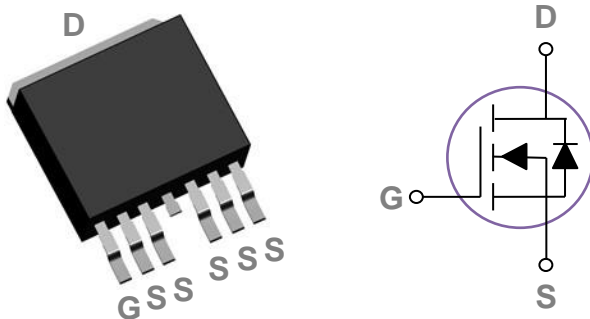
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BVDSS	RDSON	ID
40V	1mΩ	220A

Features

- 40V, 220A, $R_{DS(ON)} = 1m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO263-6L Pin Configuration



Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	220	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	139	A
I_{DM}	Drain Current – Pulsed ¹	880	A
EAS	Single Pulse Avalanche Energy ²	1377	mJ
IAS	Single Pulse Avalanche Current ²	166	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	480	W
	Power Dissipation – Derate above 25°C	3.85	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.26	$^\circ\text{C}/\text{W}$

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)
Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=32V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance ³	$V_{GS}=10V, I_D=20A$	---	0.8	1	m Ω
		$V_{GS}=6V, I_D=15A$	---	1.2	1.6	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.5	2.5	3.5	V
gfs	Forward Transconductance	$V_{DS}=10V, I_D=2A$	---	13	---	S

Dynamic Characteristics

Q_g	Total Gate Charge ^{3,4}	$V_{DS}=32V, V_{GS}=10V, I_D=10A$	---	295	450	nC
Q_{gs}	Gate-Source Charge ^{3,4}		---	72.9	110	
Q_{gd}	Gate-Drain Charge ^{3,4}		---	121	180	
$T_{d(on)}$	Turn-On Delay Time ^{3,4}	$V_{DD}=32V, V_{GS}=10V, R_G=6\Omega$ $I_D=10A$	---	74	148	ns
T_r	Rise Time ^{3,4}		---	190	380	
$T_{d(off)}$	Turn-Off Delay Time ^{3,4}		---	450	900	
T_f	Fall Time ^{3,4}		---	400	800	
C_{iss}	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, F=1\text{MHz}$	---	16800	25000	pF
C_{oss}	Output Capacitance		---	2300	3500	
C_{rss}	Reverse Transfer Capacitance		---	1700	2600	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2.1	---	Ω

Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	220	A
I_{SM}	Pulsed Source Current ³		---	---	440	A
V_{SD}	Diode Forward Voltage ³	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V
t_{rr}	Reverse Recovery Time	$V_R=30V, I_S=10A$	---	85	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	190	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=166A.$, Starting $T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

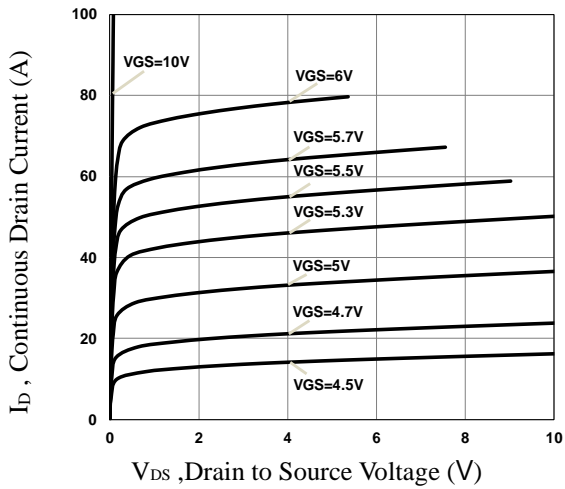


Fig.1 Typical Output Characteristics

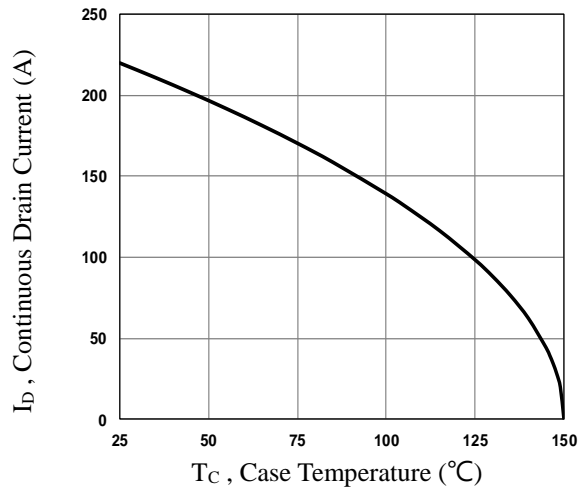


Fig.2 Continuous Drain Current vs. T_c

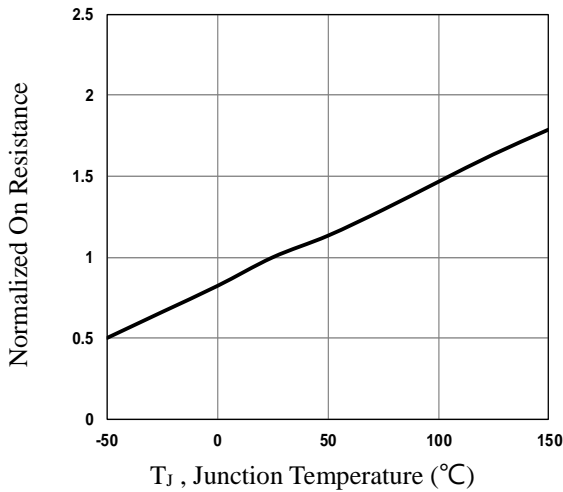


Fig.3 Normalized R_{DS(on)} vs. T_j



Fig.4 Normalized V_{th} vs. T_j

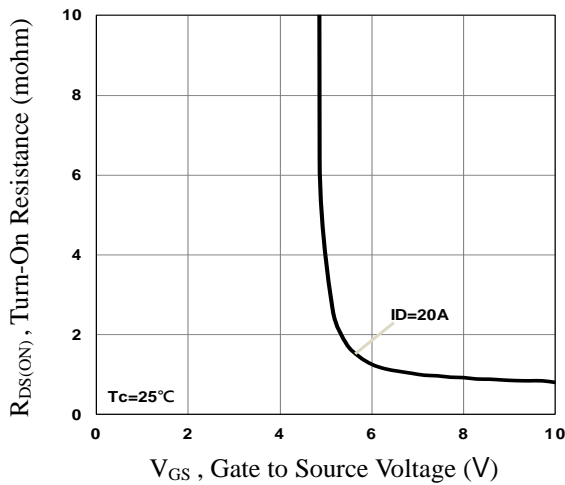


Fig.5 Turn-On Resistance vs. V_{GS}

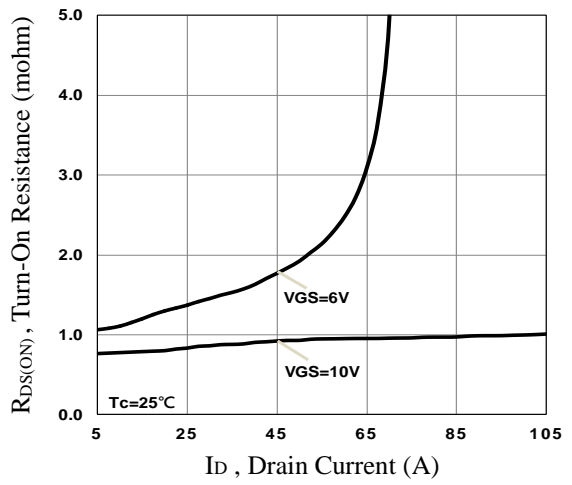


Fig.6 Turn-On Resistance vs. I_D

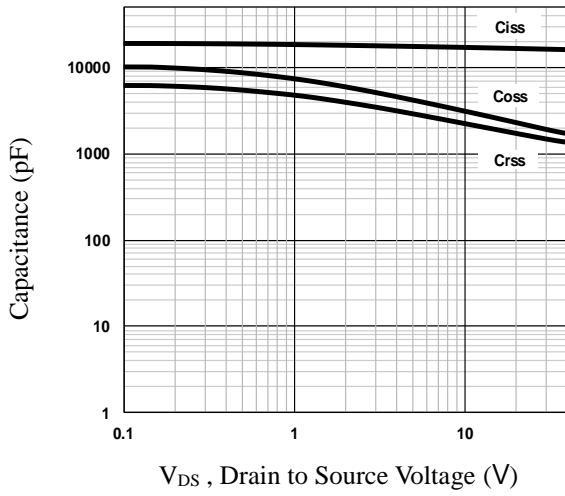


Fig.7 Capacitance Characteristics

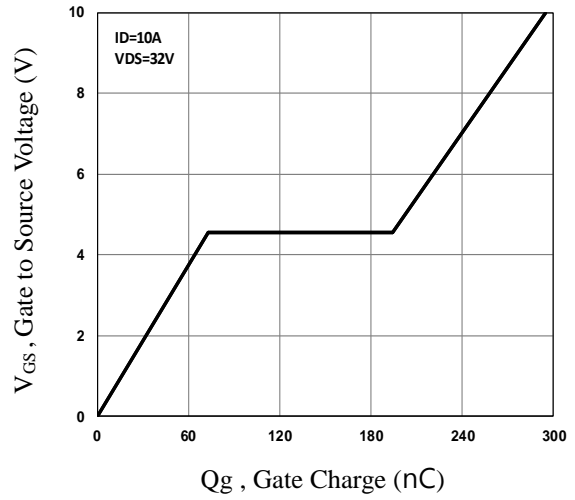


Fig.8 Gate Charge Characteristics

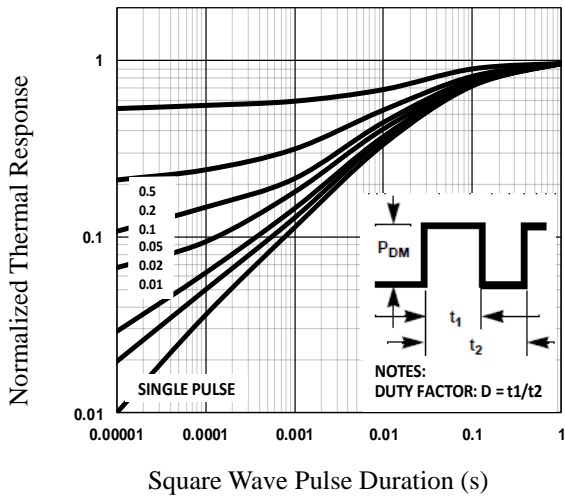


Fig.9 Normalized Transient Impedance

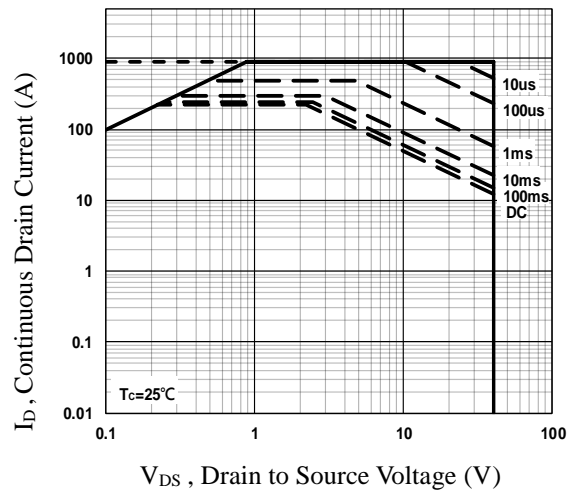


Fig.10 Maximum Safe Operation Area

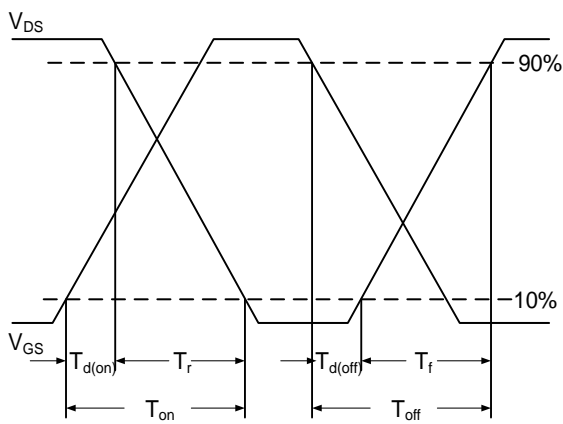


Fig.11 Switching Time Waveform

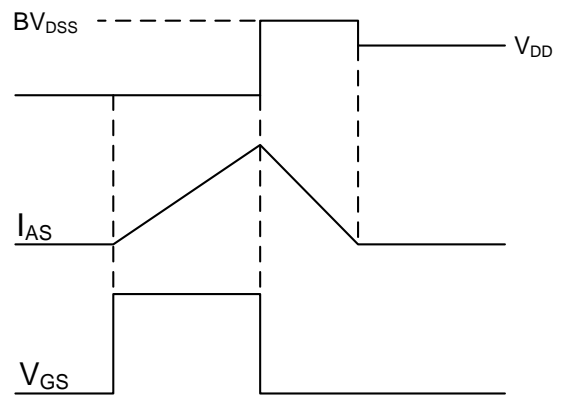
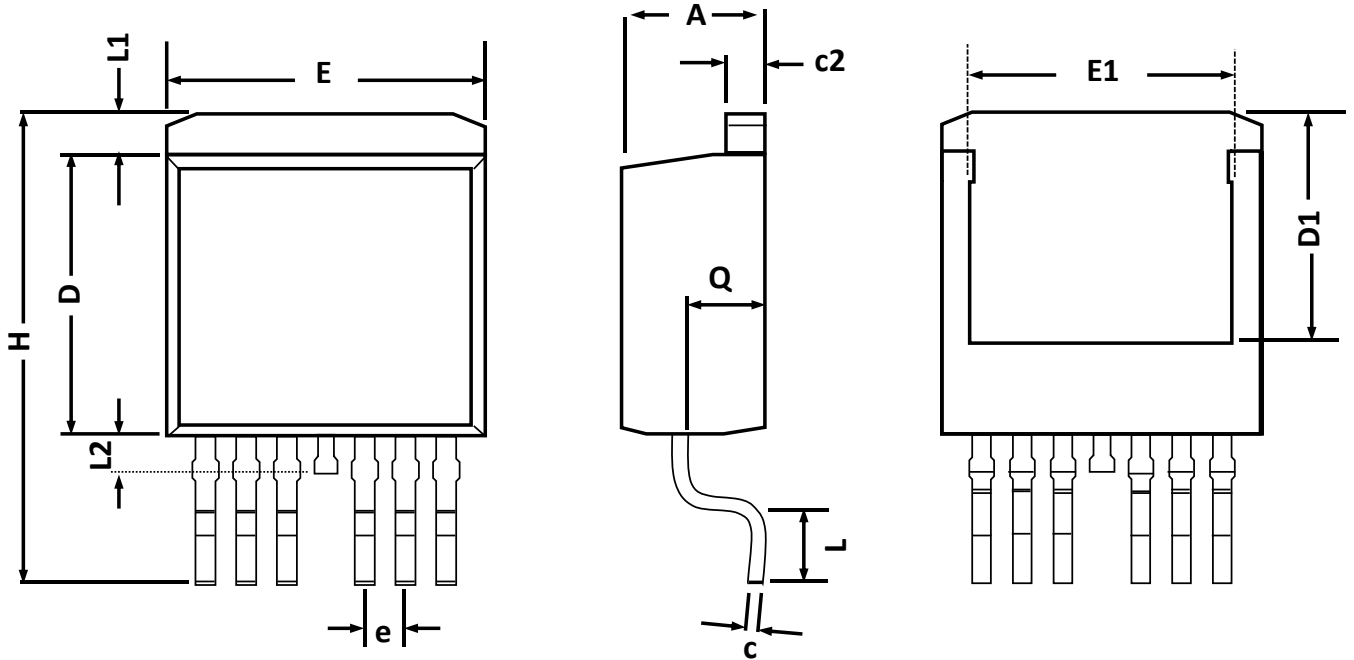


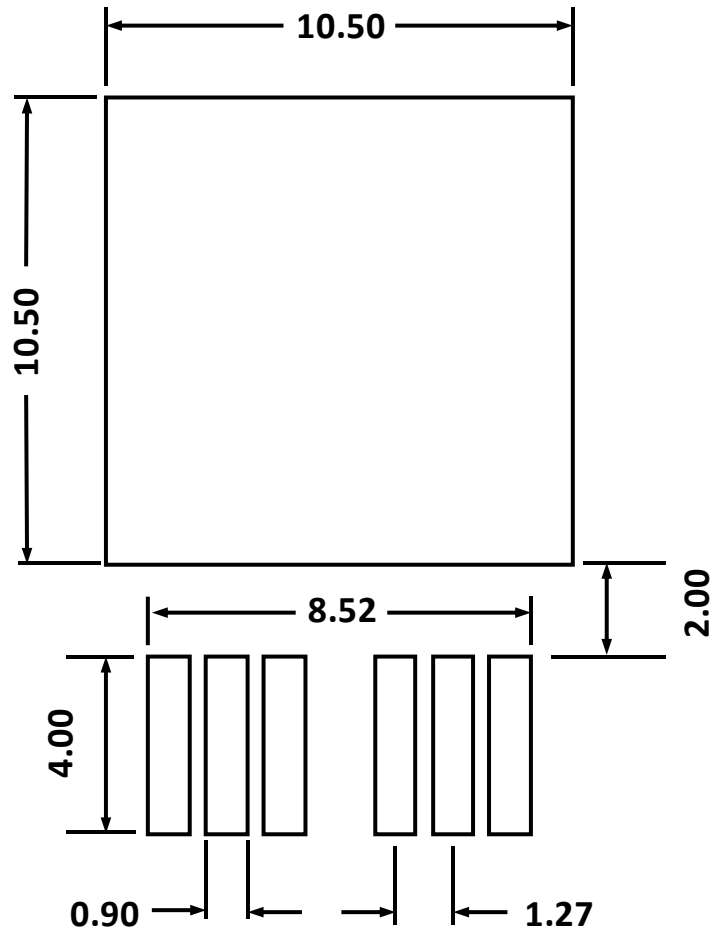
Fig.12 EAS Waveform

TO263-6L PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Max	Min	Max	Min
A	4.650	4.200	0.183	0.165
b	0.700	0.500	0.028	0.020
c	0.600	0.400	0.024	0.016
c2	1.400	1.150	0.055	0.045
D	9.050	8.800	0.356	0.346
D1	---	6.850	---	0.270
E	10.400	9.950	0.409	0.392
E1	8.550	8.150	0.337	0.321
e	1.270 BSC		0.050 BSC	
H	15.900	14.600	0.626	0.575
L	2.800	1.750	0.110	0.069
L1	1.360 REF.		0.054 REF.	
L2	1.200 REF.		0.047 REF.	
Q	2.700	2.300	0.106	0.091

TO263-6L RECOMMENDED LAND PATTERN



unit : mm