

General Description

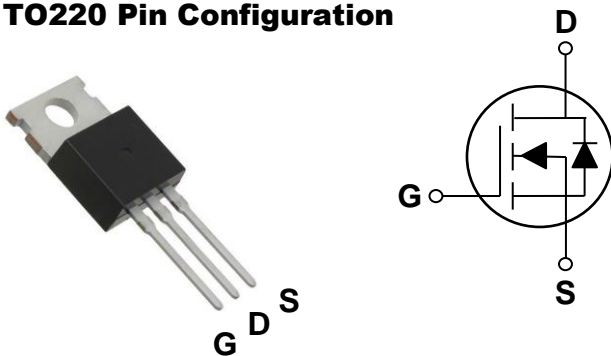
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
60V	4.5mΩ	114A

Features

- 60V, 114A, $R_{DS(ON)} = 4.5m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO220 Pin Configuration



Applications

- PowerTools
- Quick Charger
- LED applications
- Motor Drive Applications



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	114	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	72	A
I_{DM}	Drain Current – Pulsed ¹	456	A
EAS	Single Pulse Avalanche Energy ²	450	mJ
IAS	Single Pulse Avalanche Current ²	95	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	183	W
	Power Dissipation – Derate above 25°C	1.47	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-50 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-50 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	---	0.68	$^\circ\text{C}/\text{W}$

Electrical Characteristics (T_J=25 °C, unless otherwise noted)
Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	60	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =60V, V _{GS} =0V, T _J =25°C	---	---	1	μA
		V _{DS} =48V, V _{GS} =0V, T _J =125°C	---	---	10	μA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA

On Characteristics

R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A	---	3.8	4.5	mΩ
		V _{GS} =4.5V, I _D =10A	---	4.2	5.5	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250μA	1	1.6	2.2	V
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =3A	---	18	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{3,4}	V _{DS} =30V, V _{GS} =4.5V, I _D =10A	---	58.2	116	nC
Q _{gs}	Gate-Source Charge ^{3,4}		---	16.2	32	
Q _{gd}	Gate-Drain Charge ^{3,4}		---	23.4	46	
T _{d(on)}	Turn-On Delay Time ^{3,4}	V _{DD} =30V, V _{GS} =10V, R _G =6Ω I _D =1A	---	19.2	40	ns
T _r	Rise Time ^{3,4}		---	56.3	120	
T _{d(off)}	Turn-Off Delay Time ^{3,4}		---	90.8	200	
T _f	Fall Time ^{3,4}		---	21.6	40	
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, F=1MHz	---	6805	10000	pF
C _{oss}	Output Capacitance		---	445	680	
C _{rss}	Reverse Transfer Capacitance		---	195	280	
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	---	1.3	2.6	Ω

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	114	A
I _{SM}	Pulsed Source Current		---	---	228	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=95A., Starting T_J=25°C
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

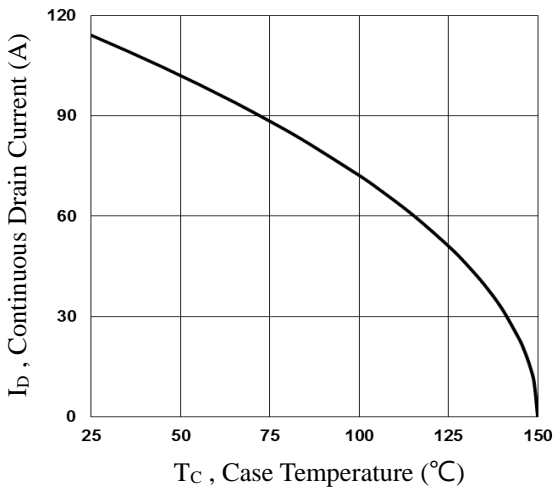


Fig.1 Continuous Drain Current vs. T_c

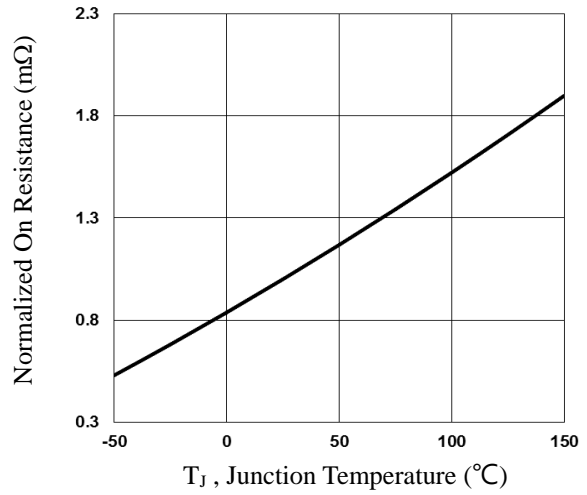


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

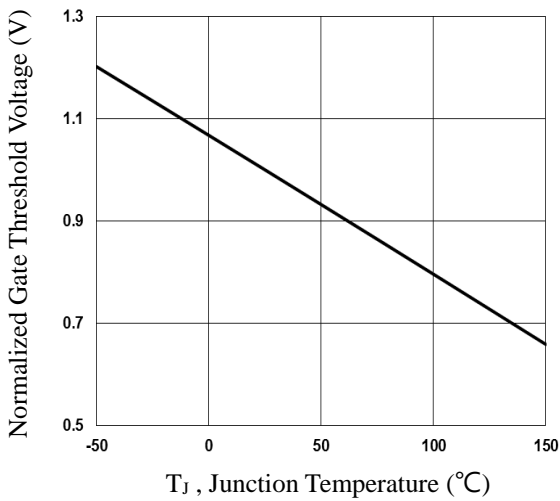


Fig.3 Normalized V_{th} vs. T_j

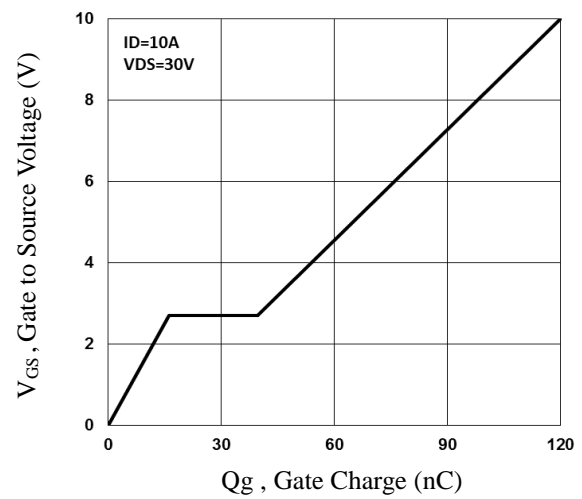


Fig.4 Gate Charge Characteristics

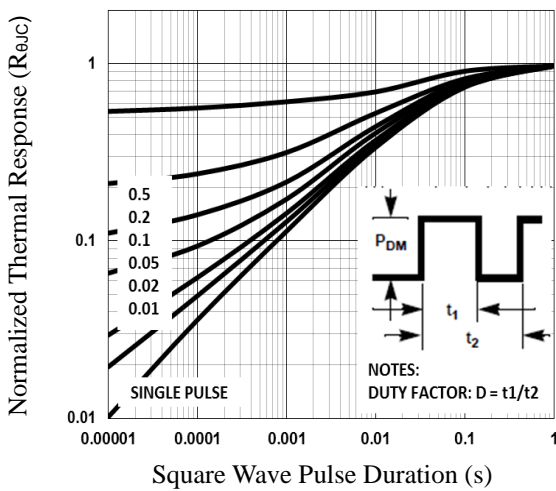


Fig.5 Normalized Transient Impedance

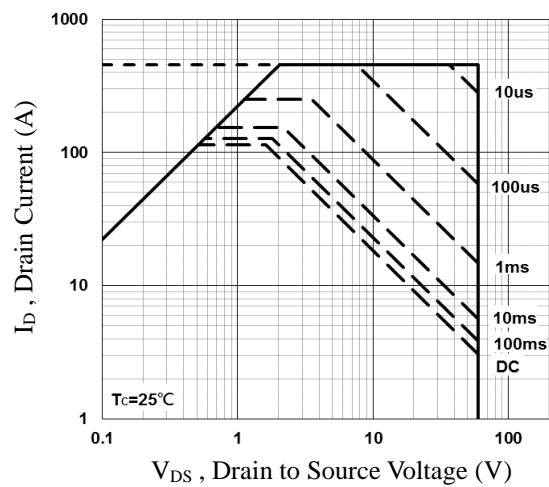


Fig.6 Maximum Safe Operation Area

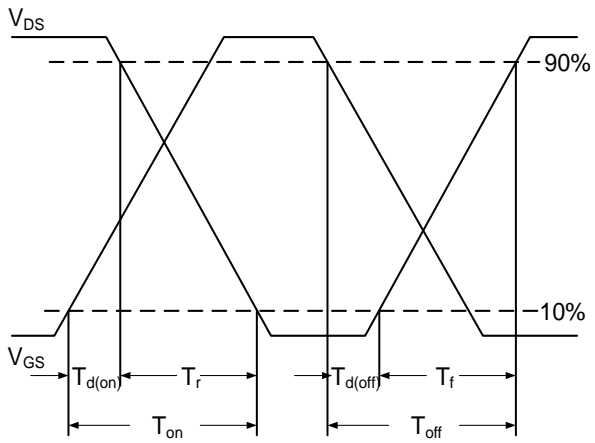


Fig.7 Switching Time Waveform

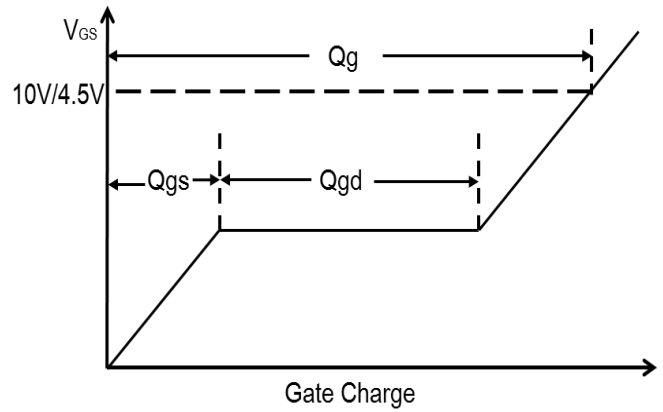
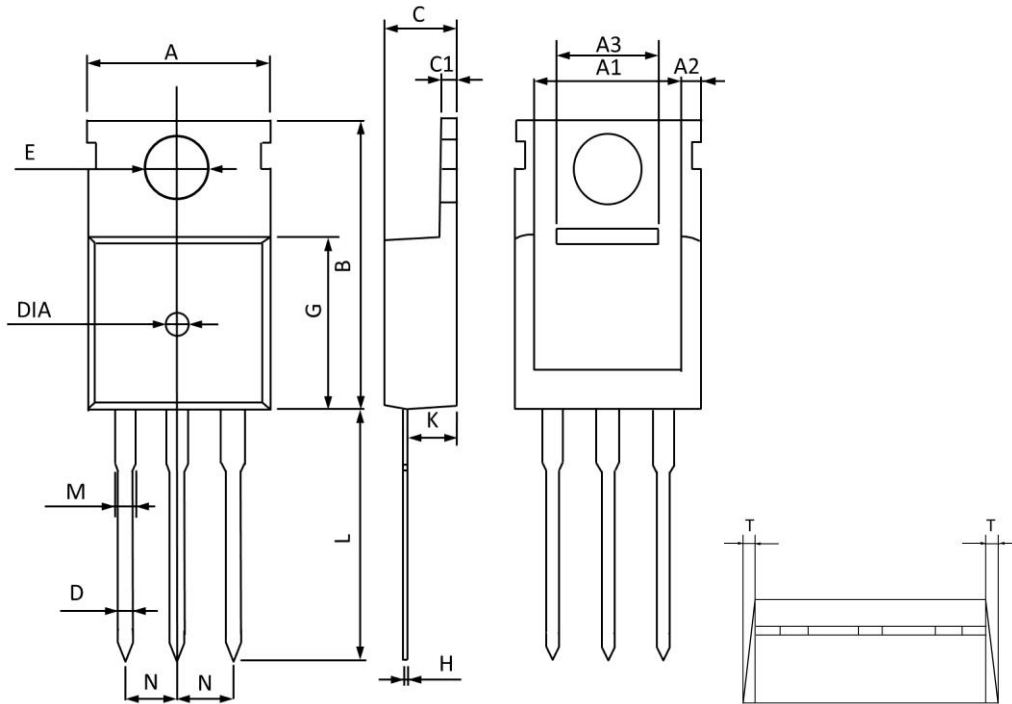


Fig.8 Gate Charge Waveform

TO220 PACKAGE INFORMATION


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.840	8.440	0.348	0.332
A2	1.250	1.050	0.049	0.041
A3	5.300	5.100	0.209	0.201
B	16.200	15.400	0.638	0.606
C	4.680	4.280	0.184	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	3.800	3.400	0.150	0.134
G	9.300	8.700	0.366	0.343
H	0.600	0.400	0.024	0.016
K	2.700	2.100	0.106	0.083
L	13.600	12.800	0.535	0.504
M	1.500	1.100	0.059	0.043
N	2.590	2.490	0.102	0.098
T	W0.35		W0.014	
DIA	Φ1.5 TYP.	deep0.2 TYP.	Φ0.059 TYP.	deep0.008 TYP.