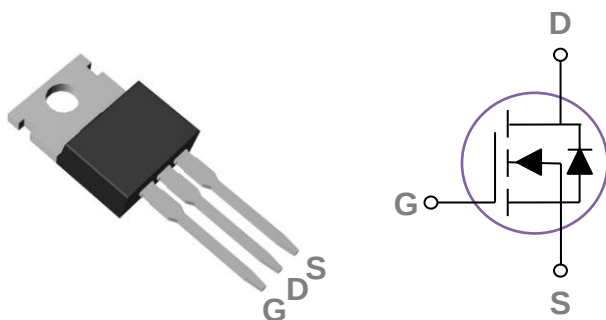


General Description

These N-Channel enhancement mode power field effect transistors are using super junction MOS 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.

TO220 Pin Configuration



BVDSS	RDS(ON)	ID
600V	85mΩ	30A

Features

- 600V,30A, $R_{DS(ON)} = 85m\Omega$ @ $V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

Applications

- PFC Power Supply Stages
- Motor Control
- DC-DC Converters
- Adapter

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	30	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	19	A
I_{DM}	Drain Current – Pulsed ¹	120	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	219	W
	Power Dissipation – Derate above 25°C	1.75	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	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.57	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	600	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=600V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V$, $V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V$, $I_D=10A$	---	70	85	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	3.5	4.0	4.5	V

Dynamic and switching Characteristics

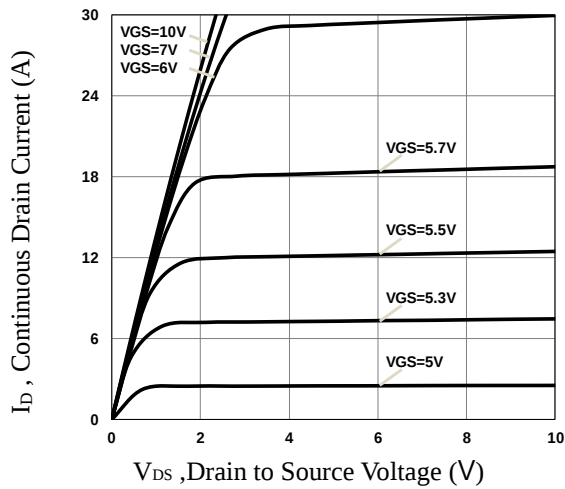
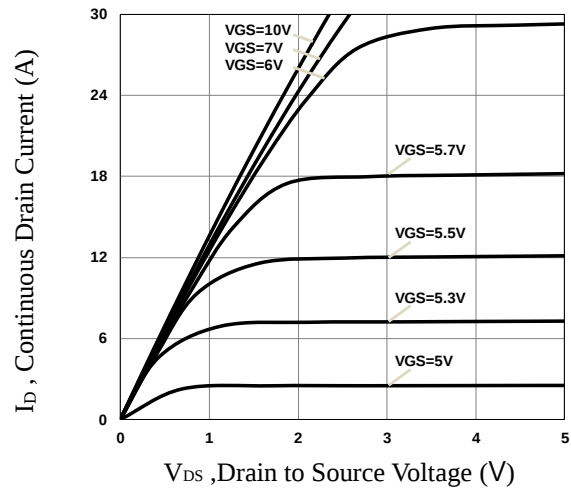
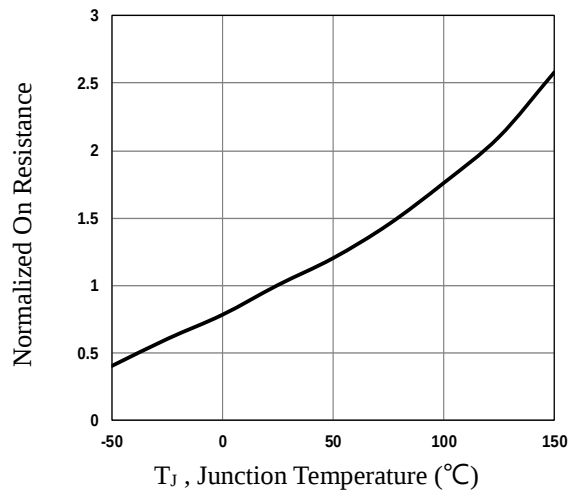
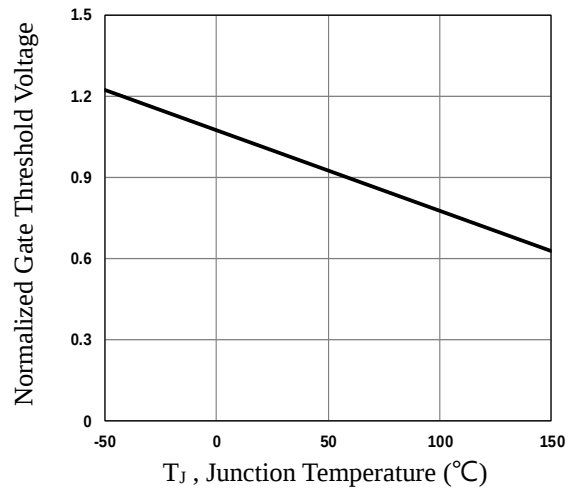
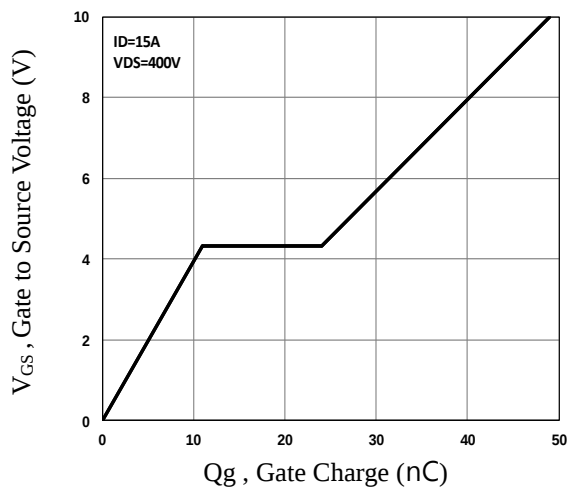
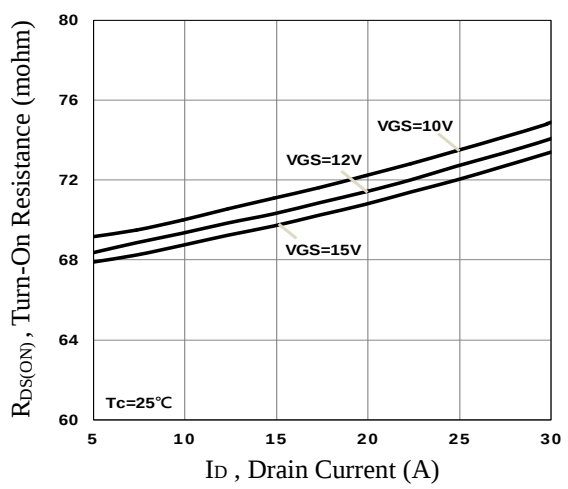
Q_g	Total Gate Charge ^{2, 3}	$V_{DS}=400V$, $V_{GS}=10V$, $I_D=15A$	---	49	100	nC
Q_{gs}	Gate-Source Charge ^{2, 3}		---	11	22	
Q_{gd}	Gate-Drain Charge ^{2, 3}		---	13	25	
$T_{d(on)}$	Turn-On Delay Time ^{2, 3}	$V_{DS}=300V$, $V_{GS}=10V$, $R_G=25\Omega$ $I_D=15A$	---	50	100	ns
T_r	Rise Time ^{2, 3}		---	40	80	
$T_{d(off)}$	Turn-Off Delay Time ^{2, 3}		---	80	160	
T_f	Fall Time ^{2, 3}		---	45	90	
C_{iss}	Input Capacitance	$V_{DS}=100V$, $V_{GS}=0V$, $F=1\text{MHz}$	---	2740	5500	pF
C_{oss}	Output Capacitance		---	85	170	
C_{rss}	Reverse Transfer Capacitance		---	2.5	5	
R_g	Total Gate Charge ^{2, 3}	$V_{GS}=0V$, $V_{DS}=0V$, $F=1\text{MHz}$	---	2.5	---	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	---	---	30	A
I_{SM}	Pulsed Source Current		---	---	60	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=15A$, $T_J=25^\circ\text{C}$	---	---	1.4	V
t_{rr}	Reverse Recovery Time	$V_R=400V$, $I_S=5A$	---	120	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	525	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.


Fig.1 Typical Output Characteristics

Fig.2 Typical Output Characteristics

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

Fig.4 Normalized V_{th} vs. T_J

Fig.5 Gate Charge Characteristics

Fig.6 Turn-On Resistance vs. I_D

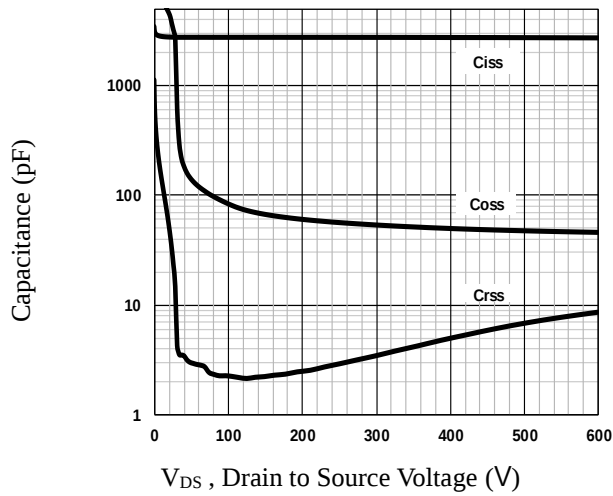


Fig.7 Capacitance Characteristics

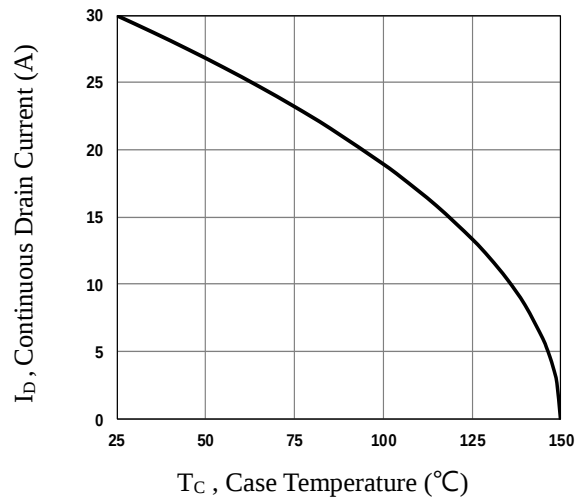


Fig.8 Continuous Drain Current vs. T_C

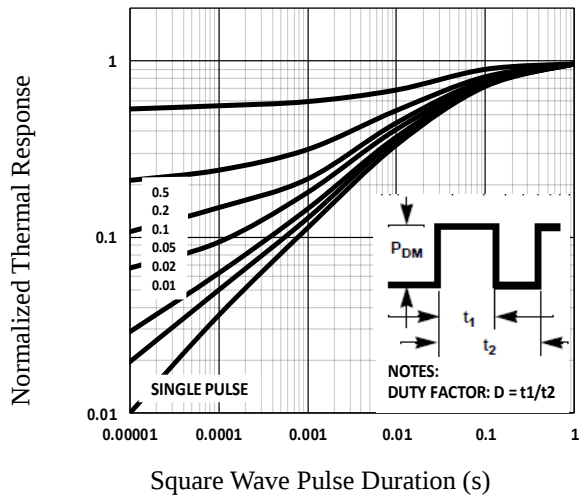


Fig.9 Normalized Transient Impedance

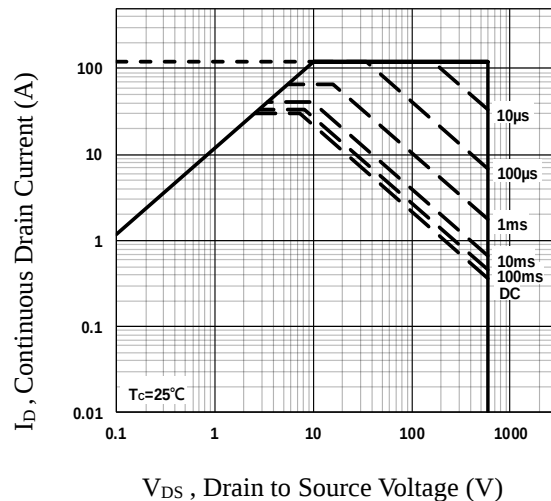


Fig.10 Maximum Safe Operation Area

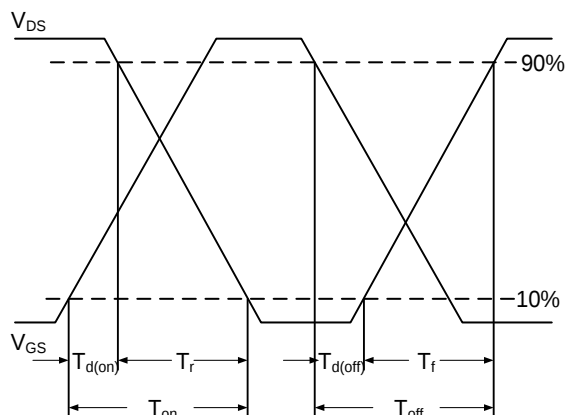


Fig.11 Switching Time Waveform

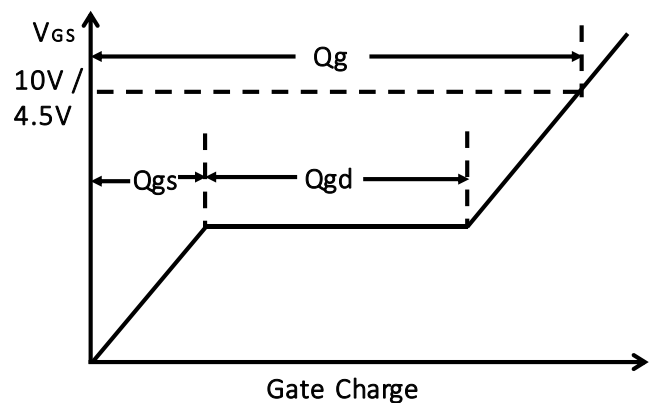
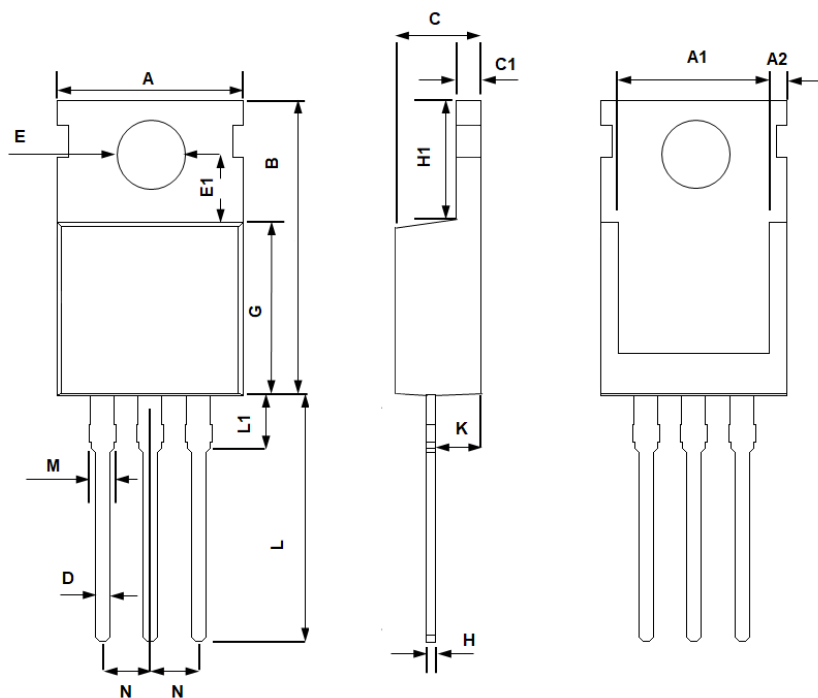


Fig.12 Gate Charge Waveform

TO220 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.400	9.700	0.409	0.382
A1	8.900	7.400	0.350	0.291
A2	1.400	0.800	0.055	0.031
B	16.500	14.500	0.650	0.571
C	4.750	4.200	0.187	0.165
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	4.000	3.300	0.157	0.130
E1	3.800	3.400	0.150	0.134
G	9.400	8.400	0.370	0.331
H	0.600	0.200	0.024	0.008
H1	6.850	6.200	0.270	0.244
K	2.850	2.100	0.112	0.083
L	14.000	12.500	0.551	0.492
L1	4.000	2.700	0.157	0.106
M	1.750	1.100	0.069	0.043
N	2.640	2.440	0.104	0.096