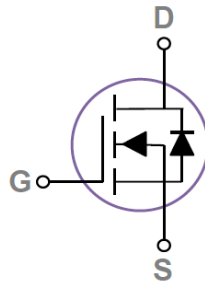
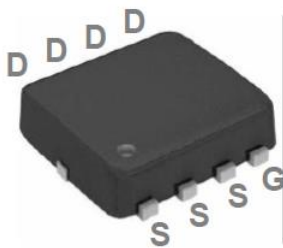


General Description

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.

DFN3x3 Pin Configuration



BVDSS	RDS(ON)	ID
30V	6mΩ	60A

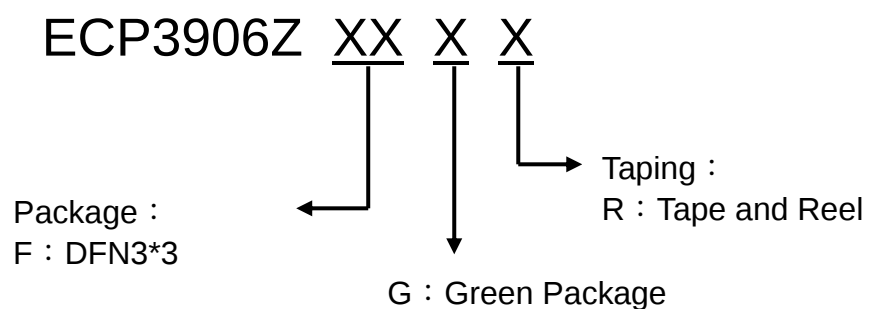
Features

- ◆ 30V, 60A, $R_{DS(ON)} = 6m\Omega @ V_{GS} = 10V$
- ◆ Improved dv/dt capability
- ◆ Fast switching
- ◆ 100% EAS Guaranteed
- ◆ Green Device Available

Application

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

Ordering Information



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_c=25^{\circ}\text{C}$)	60	A
	Drain Current – Continuous ($T_c=100^{\circ}\text{C}$)	38	A
I_{DM}	Drain Current – Pulsed ¹	240	A
EAS	Single Pulse Avalanche Energy ²	88	mJ
IAS	Single Pulse Avalanche Current ²	42	A
P_D	Power Dissipation ($T_c=25^{\circ}\text{C}$)	45	W
	Power Dissipation – Derate above 25°C	0.36	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	---	2.8	$^{\circ}\text{C/W}$

Static State Characteristics

Symbol	Parameter	Conditions	Min.	Typ	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.04	---	$\text{V}/^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$, $T_J=125$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$	---	---	± 100	nA
$R_{DS(ON)}$	Static Drain-Source On-Resistance ³	$V_{GS}=10\text{V}$, $I_D=20\text{A}$	---	4.8	6	m
		$V_{GS}=4.5\text{V}$, $I_D=10\text{A}$	---	6.7	9	m
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$	1.2	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4	---	$\text{mV}/^{\circ}\text{C}$
gfs	Forward Transconductance	$V_{DS}=10\text{V}$, $I_D=10\text{A}$	---	23	---	S

Dynamic Characteristics

Q_g	Total Gate Charge ^{3, 4}	$V_{DS}=15\text{V}$, $V_{GS}=4.5\text{V}$, $I_D=20\text{A}$	---	11	18	nC
Q_{gs}	Gate-Source Charge ^{3, 4}		---	1.8	3.8	
Q_{gd}	Gate-Drain Charge ^{3, 4}		---	6.8	12	
$T_{d(on)}$	Turn-On Delay Time ^{3, 4}	$V_{DD}=15\text{V}$, $V_{GS}=10\text{V}$, $R_G=3.3$ $I_D=15\text{A}$	---	7.5	14	ns
T_r	Rise Time ^{3, 4}		---	14	28	
$T_{d(off)}$	Turn-Off Delay Time ^{3, 4}		---	35	67	
T_f	Fall Time ^{3, 4}		---	9.6	18	

C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1MHz$	---	121	1800	pF
C_{oss}	Output Capacitance		---	190	280	
C_{rss}	Reverse Transfer Capacitance		---	100	150	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	---	2.5	5	Ω

Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	$V_{DD}=25V, L=0.1mH, I_{AS}=20A$	20	---	---	mJ

Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V, \text{ Force Current}$	---	---	60	A
I_{SM}	Pulsed Source Current ³		---	---	240	A
V_{SD}	Diode Forward Voltage ³	$V_{GS}=0V, I_S=1A, T_J=25^\circ C$	---	---	1	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=1A, di/dt=100A/\mu s, T_J=25^\circ C$	---	---	---	ns
Q_{rr}	Reverse Recovery Charge		---	---	---	nC

Note :

- 1.Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=42A, R_G=25\Omega$, Starting $T_J=25^\circ C$.
- 3.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 4.Essentially independent of operating temperature.

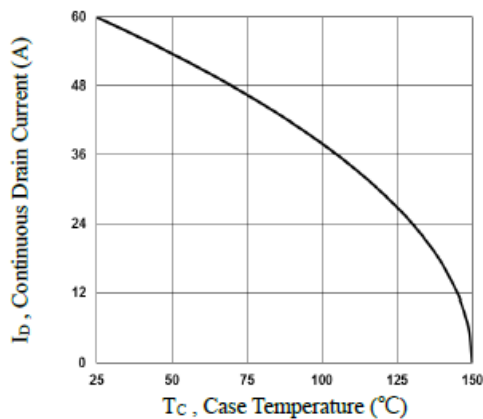


Fig.1 Continuous Drain Current vs. T_c

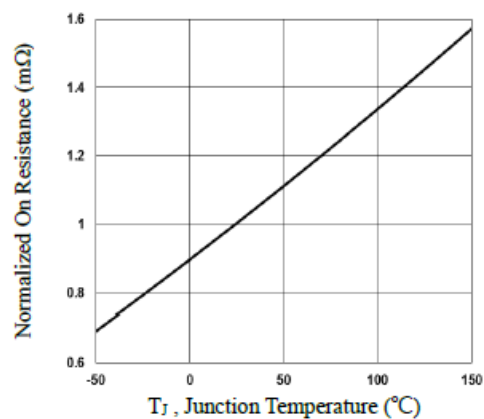


Fig.2 Normalized RDSON vs. T_j

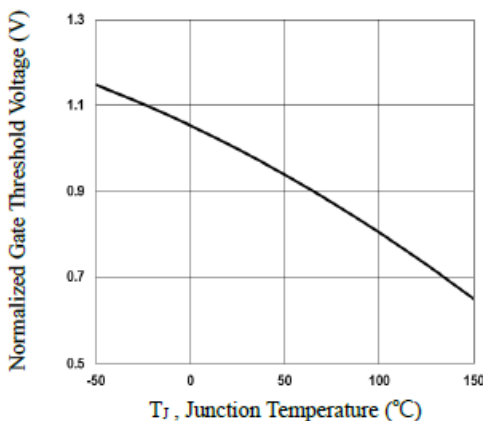


Fig.3 Normalized V_{th} vs. T_j

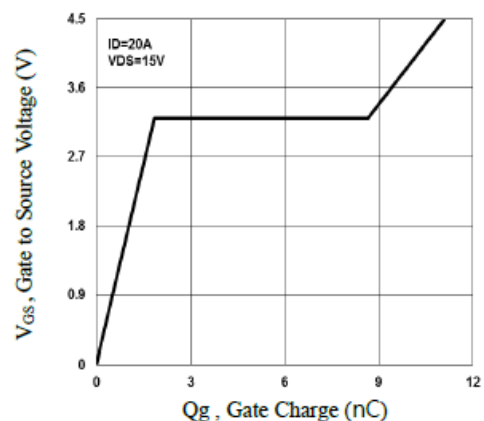


Fig.4 Gate Charge Waveform

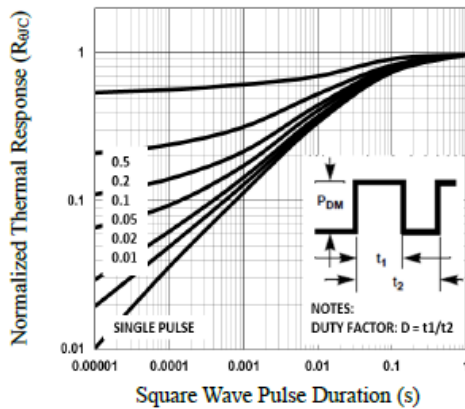


Fig.5 Normalized Transient Impedance

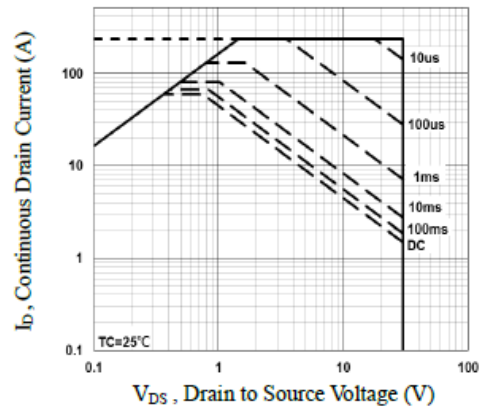


Fig.6 Maximum Safe Operation Area

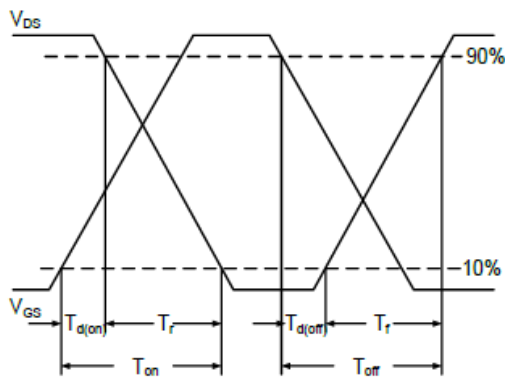


Fig.7 Switching Time Waveform

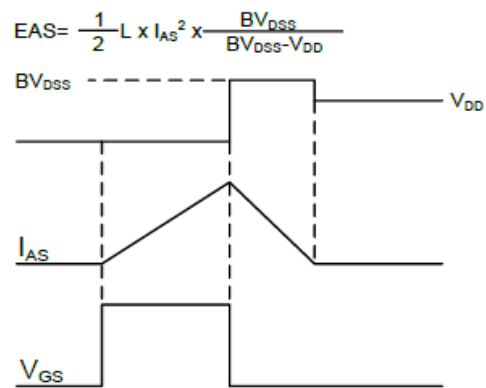
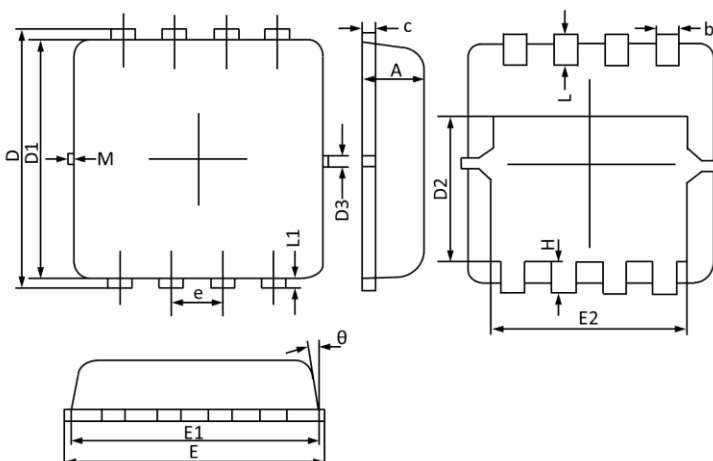


Fig.8 EAS Waveform

DFN3x3 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.013
c	0.100	0.250	0.004	0.009
D	3.250	3.450	0.128	0.135
D1	3.000	3.200	0.119	0.125
D2	1.780	1.980	0.070	0.077
D3	0.130 REF		0.005 REF	
E	3.200	3.400	0.126	0.133
E1	3.000	3.200	0.119	0.125
E2	2.390	2.590	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.500	0.011	0.019
L	0.300	0.500	0.011	0.019
L1	0.130 REF		0.005 REF	
theta	0°	12°	0°	12°
M	0.150 REF		0.006 REF	