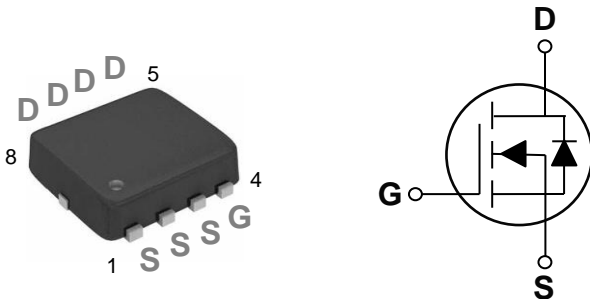


## 30V N-Channel MOSFETs

### 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.

### PPAK 3x3 Pin Configuration



BVDSS	RDSON	ID
30V	3.8mΩ	80A

### Features

- 30V,80A,  $R_{DS(ON)} = 3.8m\Omega @ V_{GS} = 10V$
- Improved  $dv/dt$  capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

### Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2<sup>nd</sup> SR

### Absolute Maximum Ratings (Tc=25 °C unless otherwise noted)

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current – Continuous (T <sub>C</sub> =25°C)	80	A
	Drain Current – Continuous (T <sub>C</sub> =100°C)	51	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	320	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	125	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	50	A
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> =25°C)	66	W
	Power Dissipation – Derate above 25°C	0.53	W/°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 175	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 175	°C

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	62	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction to Case	---	2	°C/W



# FTK3904Z

## 30V N-Channel MOSFETs

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

### Static State Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	0.03	---	$V/^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=24V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>3</sup>	$V_{GS}=10V, I_D=24A$	---	2.9	3.8	m $\Omega$
		$V_{GS}=4.5V, I_D=12A$	---	4.3	5.5	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5	---	$\text{mV}/^\circ\text{C}$
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=10A$	---	28	---	S

### Dynamic Characteristics

$Q_g$	Total Gate Charge <sup>3, 4</sup>	$V_{DS}=15V, V_{GS}=4.5V, I_D=24A$	---	24	34	nC
$Q_{gs}$	Gate-Source Charge <sup>3, 4</sup>		---	4.2	6	
$Q_{gd}$	Gate-Drain Charge <sup>3, 4</sup>		---	13	18	
$T_{d(on)}$	Turn-On Delay Time <sup>3, 4</sup>	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega$ $I_D=15A$	---	12.6	24	ns
$T_r$	Rise Time <sup>3, 4</sup>		---	19.5	37	
$T_{d(off)}$	Turn-Off Delay Time <sup>3, 4</sup>		---	42.8	81	
$T_f$	Fall Time <sup>3, 4</sup>		---	13.2	25	
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	---	2200	3190	pF
$C_{oss}$	Output Capacitance		---	280	405	
$C_{rss}$	Reverse Transfer Capacitance		---	177	255	
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2	4	$\Omega$

### Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	$V_{DD}=25V, L=0.1\text{mH}, I_{AS}=24A$	31	---	---	mJ

### Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	80	A
$I_{SM}$	Pulsed Source Current <sup>3</sup>		---	---	320	A
$V_{SD}$	Diode Forward Voltage <sup>3</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V
$t_{rr}$	Reverse Recovery Time	$V_{GS}=0V, I_S=1A, di/dt=100A/\mu s$	---	---	---	ns
$Q_{rr}$	Reverse Recovery Charge	$T_J=25^\circ\text{C}$	---	---	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=50A, R_G=25\Omega$ , 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.

## 30V N-Channel MOSFETs

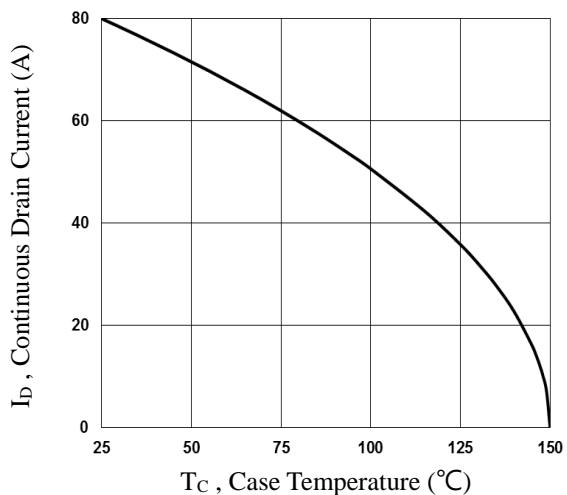


Fig.1 Continuous Drain Current vs.  $T_c$

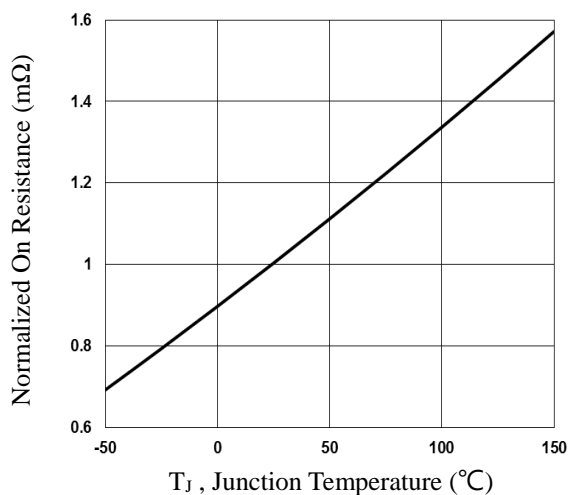


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

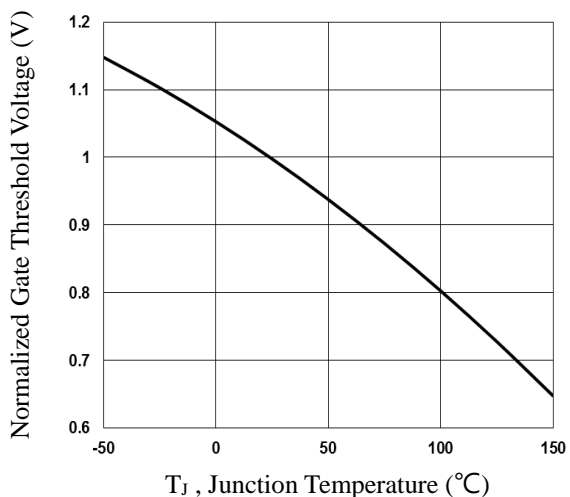


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

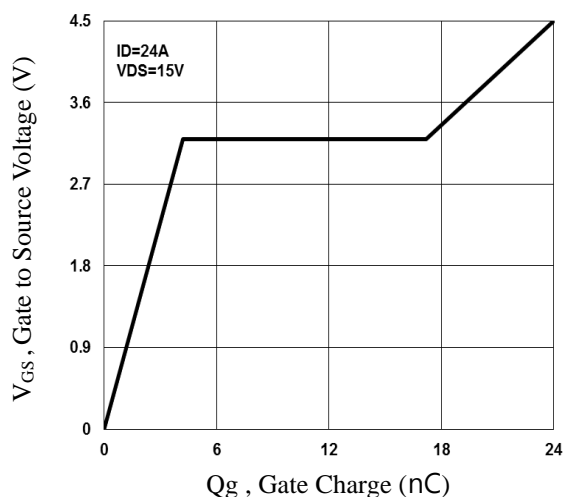


Fig.4 Gate Charge Waveform

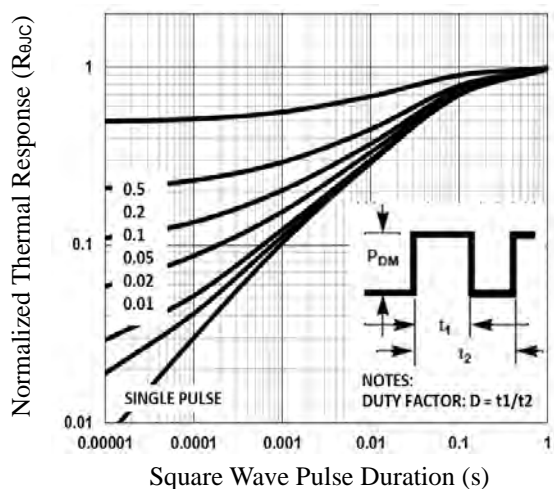


Fig.5 Normalized Transient Impedance

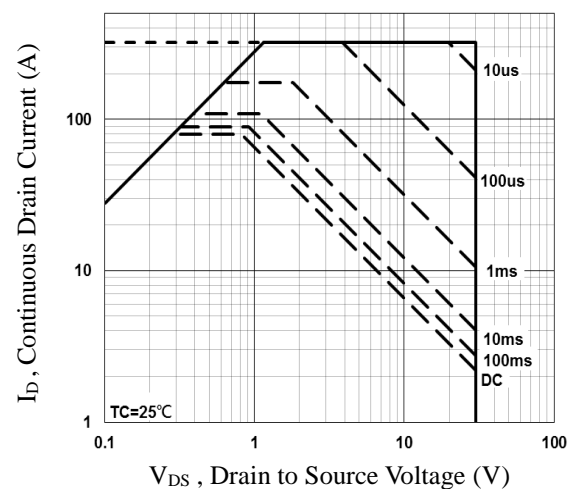


Fig.6 Maximum Safe Operation Area

## 30V N-Channel MOSFETs

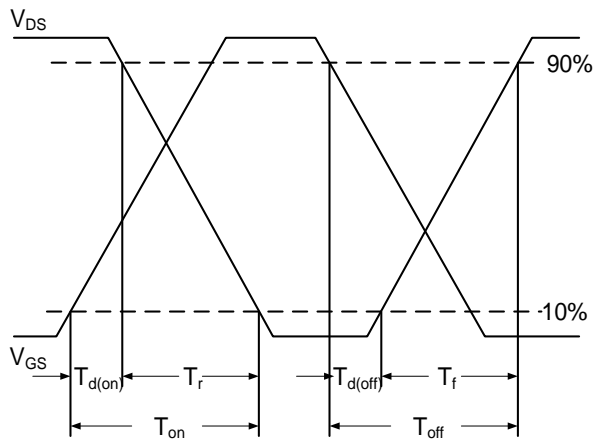


Fig.7 Switching Time Waveform

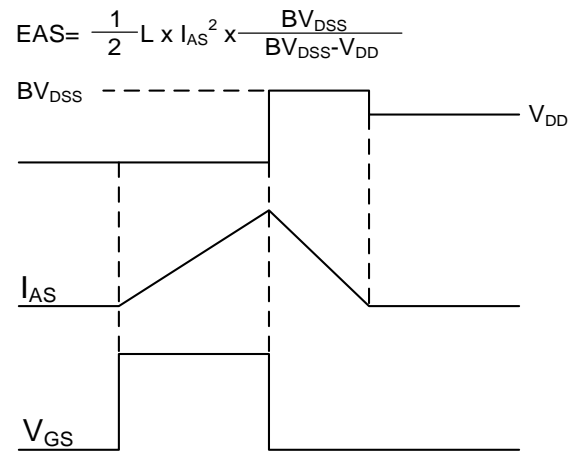
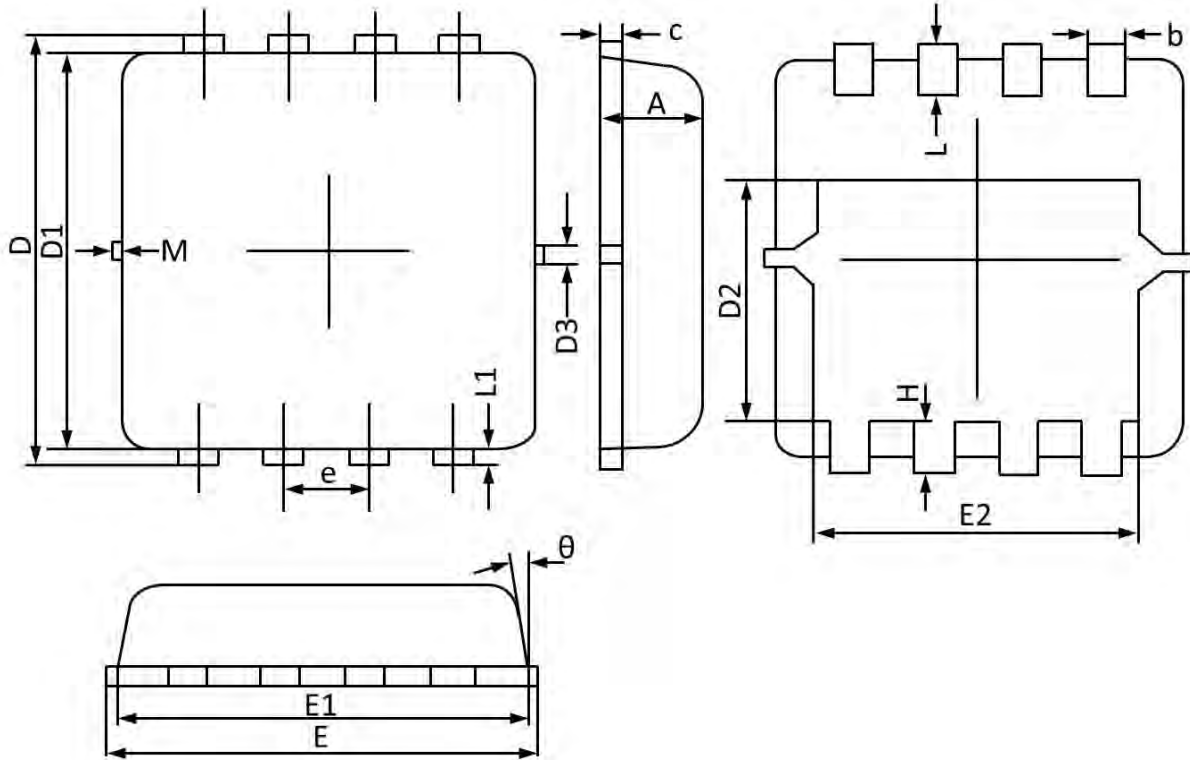


Fig.8 EAS Waveform

## 30V N-Channel MOSFETs

### PPAK3x3 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	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	