

40V N-Channel MOSFETs

General Description

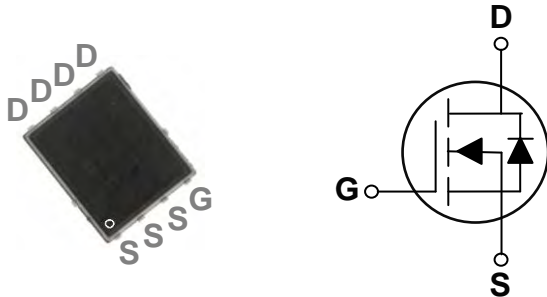
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	R _{DS(ON)}	I _D
40V	2.8mΩ	100A

Features

- 40V, 100A, R_{DS(ON)} = 2.8mΩ @ V_{GS} = 10V
- Improved dv/dt capability
- Fast switching
- Green Device Available

PPAK5x6 Pin Configuration



Applications

- MB / VGA / V_{core}
- POL Applications
- SMPS 2nd SR

Absolute Maximum Ratings (T_c=25°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°C)	100	A
	Drain Current – Continuous (T _c =100°C)	63	A
I _{DM}	Drain Current – Pulsed ¹	400	A
EAS	Single Pulse Avalanche Energy ²	312	mJ
IAS	Single Pulse Avalanche Current ²	79	A
P _D	Power Dissipation (T _c =25°C)	135	W
	Power Dissipation – Derate above 25°C	1.08	W/°C
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction to ambient	---	62	°C/W
R _{θJC}	Thermal Resistance Junction to Case	---	0.92	°C/W



FTK4960DFN56

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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
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.03	---	V/ $^\circ\text{C}$
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	$V_{GS}=10V, I_D=25A$	---	2.2	2.8	m Ω
		$V_{GS}=4.5V, I_D=12A$	---	2.6	3.5	m Ω
$V_{GS(th)}$	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	---	mV/ $^\circ\text{C}$
gfs	Forward Transconductance	$V_{DS}=10V, I_D=2A$	---	16	---	S

Dynamic Characteristics

Q_g	Total Gate Charge ^{3,4}	$V_{DS}=20V, V_{GS}=4.5V, I_D=10A$	---	44.4	80	nC
Q_{gs}	Gate-Source Charge ^{3,4}		---	9.6	18	
Q_{gd}	Gate-Drain Charge ^{3,4}		---	16	30	
$T_{d(on)}$	Turn-On Delay Time ^{3,4}	$V_{DD}=20V, V_{GS}=10V, R_G=6\Omega$ $I_D=1A$	---	28	50	ns
T_r	Rise Time ^{3,4}		---	3.2	6.5	
$T_{d(off)}$	Turn-Off Delay Time ^{3,4}		---	89	160	
T_f	Fall Time ^{3,4}		---	14	28	
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	---	4940	7800	pF
C_{oss}	Output Capacitance		---	425	800	
C_{riss}	Reverse Transfer Capacitance		---	170	330	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	1.4	2.8	Ω

Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	100	A
I_{SM}	Pulsed Source Current ³		---	---	200	A
V_{SD}	Diode Forward Voltage ³	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=79A$, 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.

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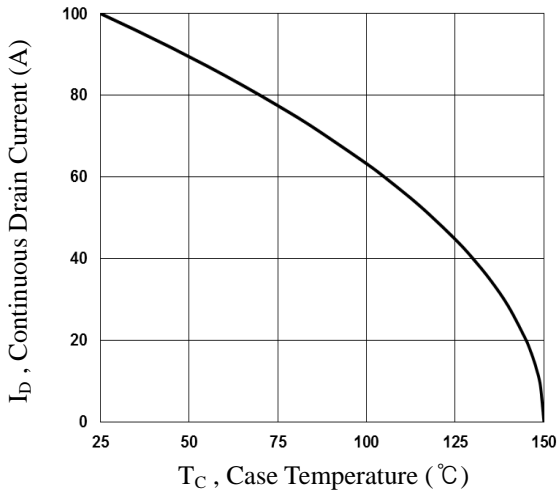


Fig.1 Continuous Drain Current vs. T_c

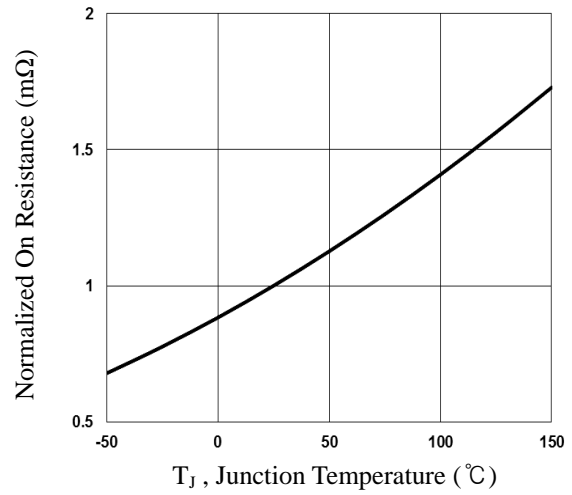


Fig.2 Normalized R_{DSON} vs. T_j

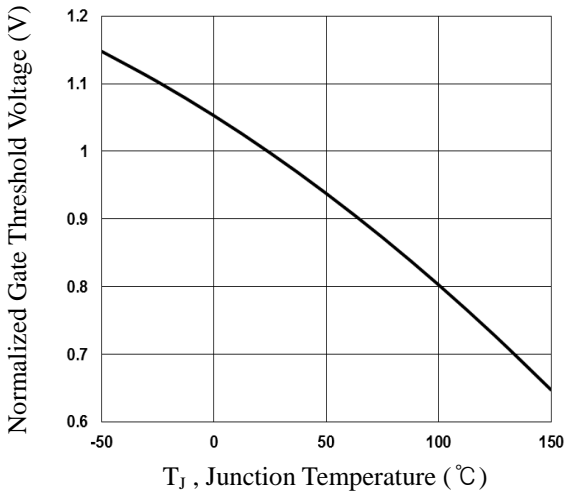


Fig.3 Normalized V_{th} vs. T_j

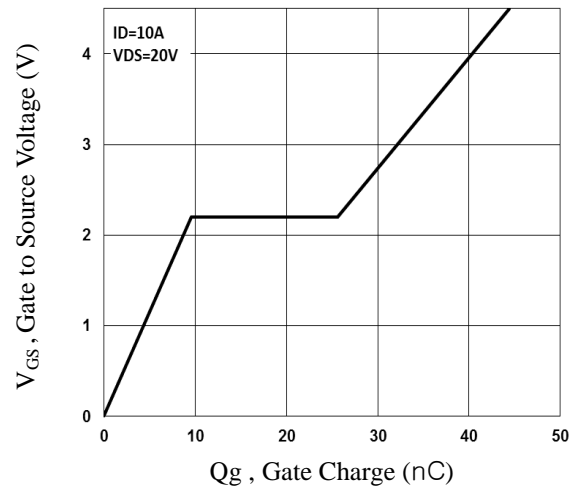


Fig.4 Gate Charge Waveform

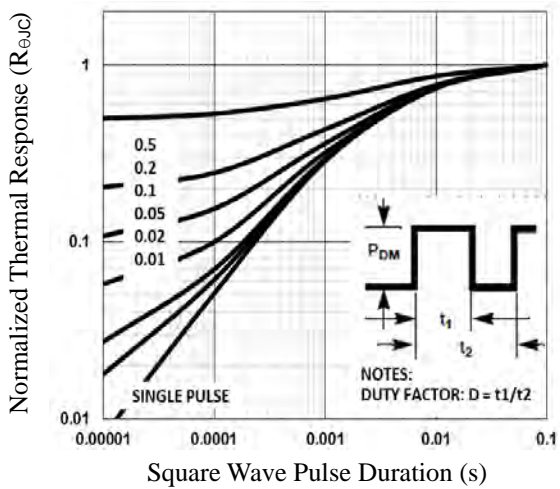


Fig.5 Normalized Transient Impedance

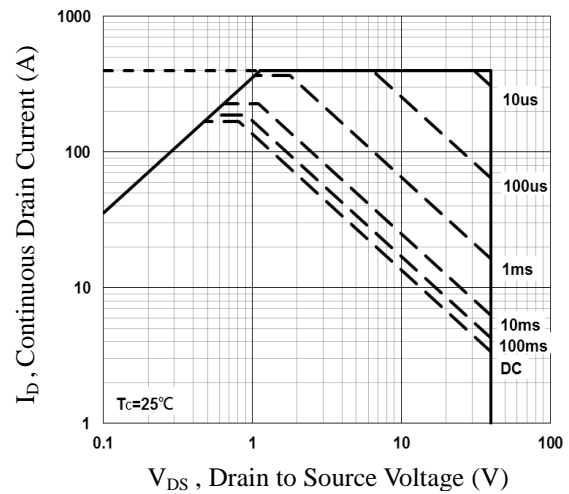


Fig.6 Maximum Safe Operation Area

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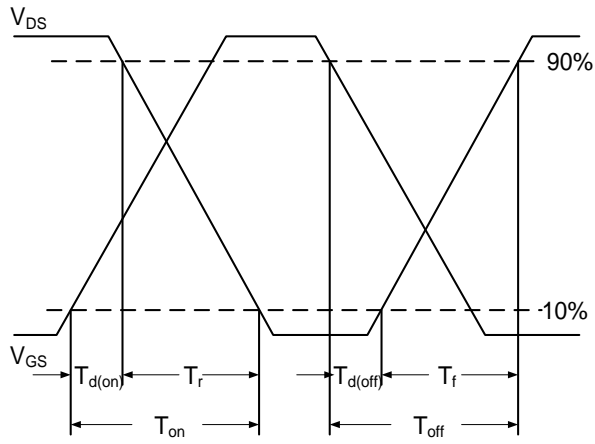


Fig.7 Switching Time Waveform

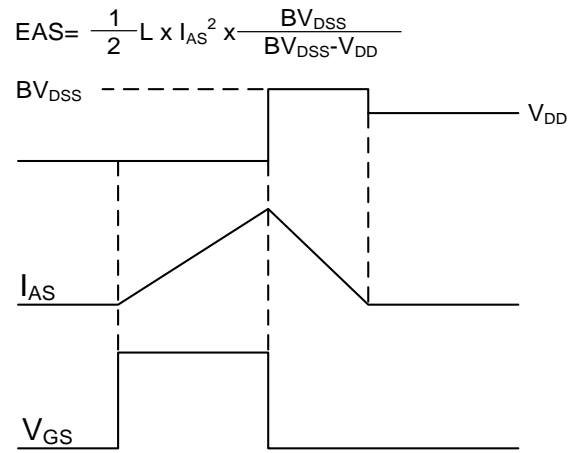
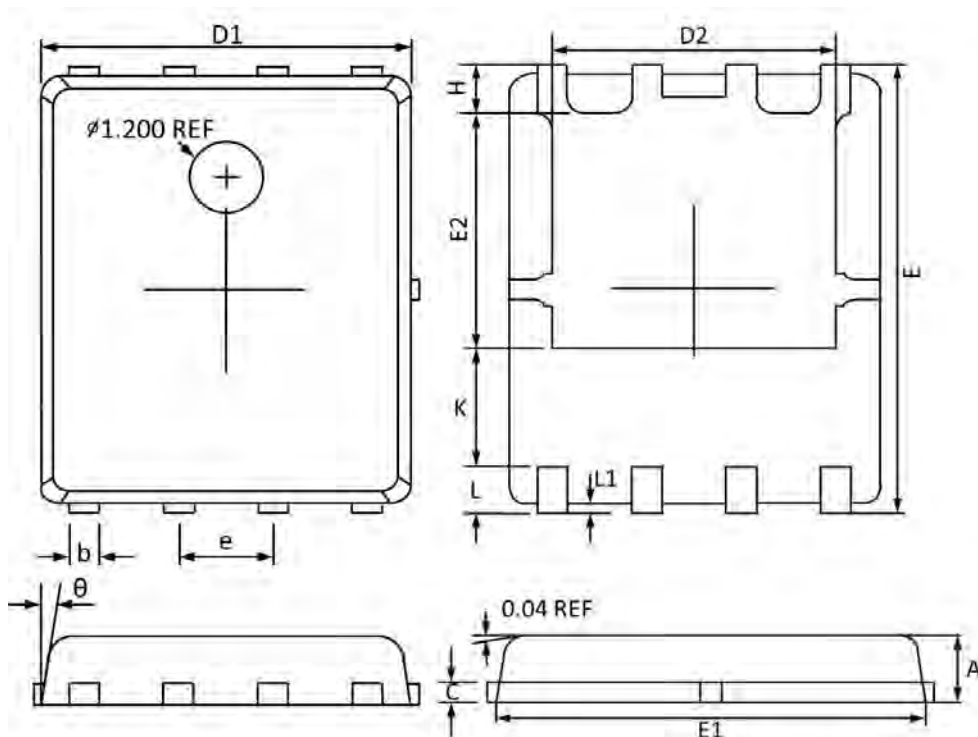


Fig.8 EAS Waveform

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PPAK5x6 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	0.800	0.043	0.031
b	0.510	0.330	0.020	0.013
C	0.300	0.200	0.012	0.008
D1	5.100	4.800	0.201	0.189
D2	4.100	3.610	0.161	0.142
E	6.200	5.900	0.244	0.232
E1	5.900	5.700	0.232	0.224
E2	3.780	3.350	0.149	0.132
e	1.27BSC		0.05BSC	
H	0.700	0.410	0.028	0.016
K	1.500	1.100	0.059	0.043
L	0.710	0.510	0.028	0.020
L1	0.200	0.060	0.008	0.002