

General Description

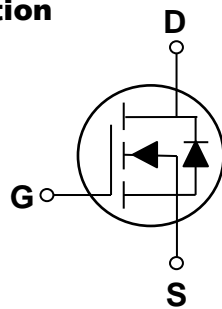
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
20V	1.4mΩ	210A

Features

- 20V,210A, $R_{DS(ON)} = 1.4m\Omega @ V_{GS} = 4.5V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

PPAK5X6 Pin Configuration



Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR
- Networking
- Load Switch



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$) (Chip Limitation)	210	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$) (Chip Limitation)	130	A
I_{DM}	Drain Current – Pulsed ¹	840	A
EAS	Single Pulse Avalanche Energy ²	605	mJ
IAS	Single Pulse Avalanche Current ²	110	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	142	W
	Power Dissipation – Derate above 25°C	1.14	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	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.88	$^\circ\text{C/W}$

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 =250uA	20	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.013	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =16V, V _{GS} =0V, T _J =125°C	---	---	10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	100	nA

On Characteristics

R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =4.5V, I _D =15A	---	1.1	1.4	mΩ
		V _{GS} =2.5V, I _D =10A	---	1.24	1.7	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	0.4	0.6	1.0	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-3.5	---	mV/°C
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =3A	---	30	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{3, 4}	V _{DS} =16V, V _{GS} =4.5V, I _D =10A	---	173	260	nC
Q _{gs}	Gate-Source Charge ^{3, 4}		---	35	53	
Q _{gd}	Gate-Drain Charge ^{3, 4}		---	34	51	
T _{d(on)}	Turn-On Delay Time ^{3, 4}	V _{DD} =10V, V _{GS} =4.5V, R _G =3.3Ω I _D =1A	---	30	60	ns
T _r	Rise Time ^{3, 4}		---	80	160	
T _{d(off)}	Turn-Off Delay Time ^{3, 4}		---	180	360	
T _f	Fall Time ^{3, 4}		---	60	120	
C _{iss}	Input Capacitance	V _{DS} =16V, V _{GS} =0V, F=1MHz	---	11950	17900	pF
C _{oss}	Output Capacitance		---	1347	2020	
C _{rss}	Reverse Transfer Capacitance		---	1008	1500	
R _g	Gate resistance		V _{GS} =0V, V _{DS} =0V, F=1MHz	---	1.35	

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	---	---	210	A
I _{SM}	Pulsed Source Current		---	---	420	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1	V

- V_{DD}=20V, V_{GS}=10V, L=0.1mH, I_{AS}=110A., R_G=25Ω, Starting T_J=25°C.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
- Essentially independent of operating temperature.

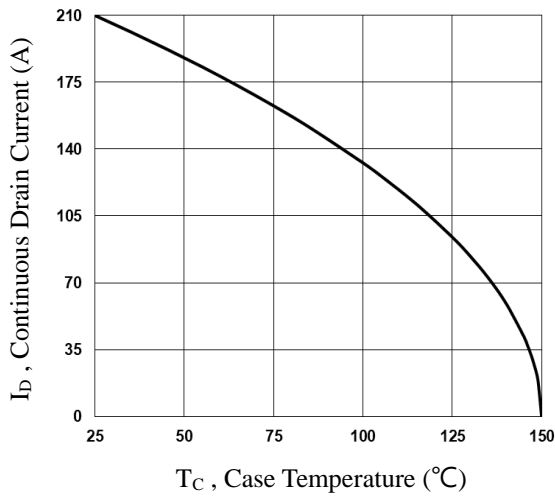


Fig.1 Continuous Drain Current vs. T_c

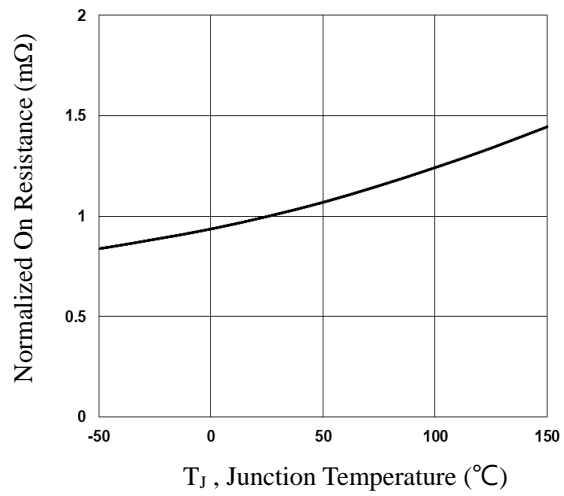


Fig.2 Normalized RD_{SON} vs. T_j

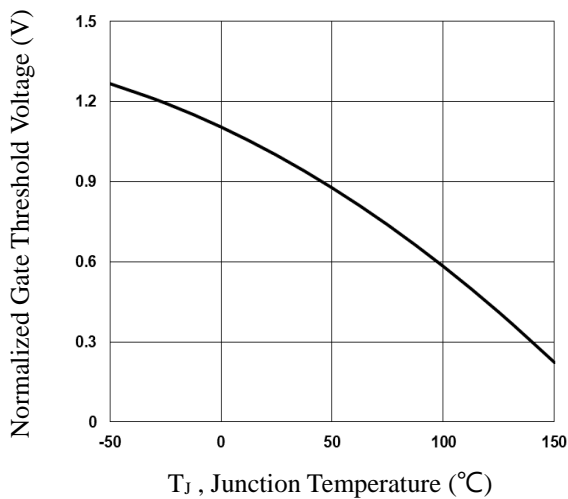


Fig.3 Normalized V_{th} vs. T_j

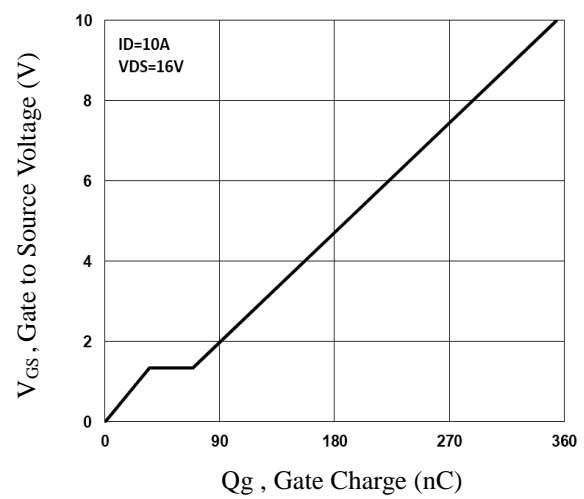


Fig.4 Gate Charge Characteristics

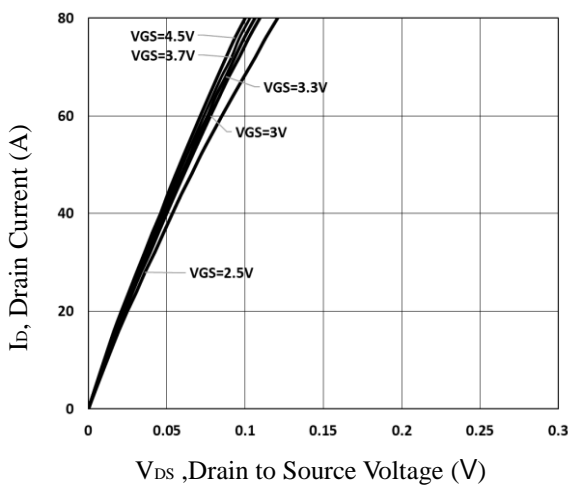


Fig.5 Typical Output Characteristics

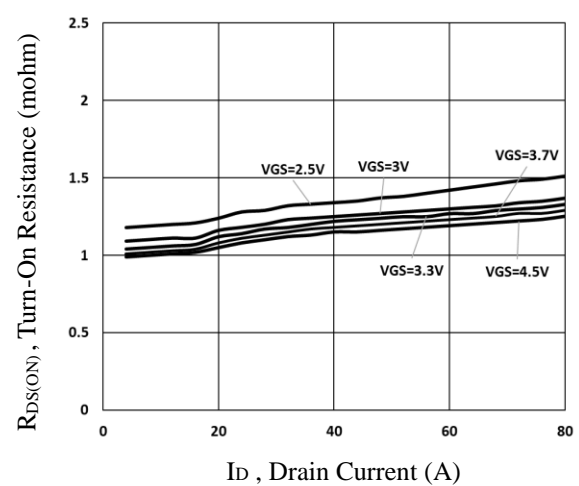


Fig.6 Turn-On Resistance vs. I_D

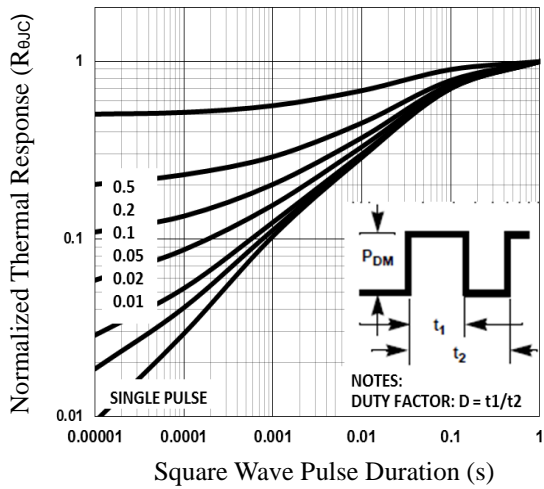


Fig.7 Normalized Transient Impedance

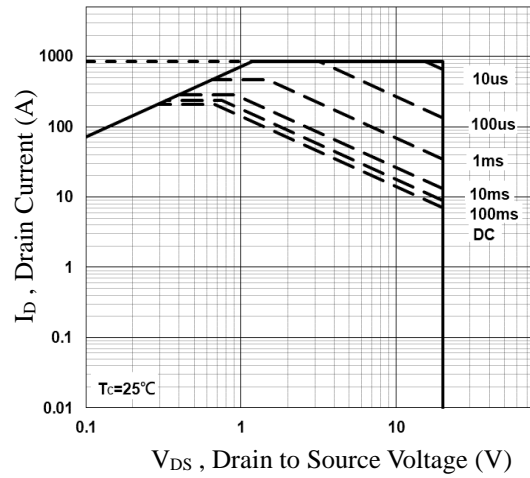


Fig.8 Maximum Safe Operation Area

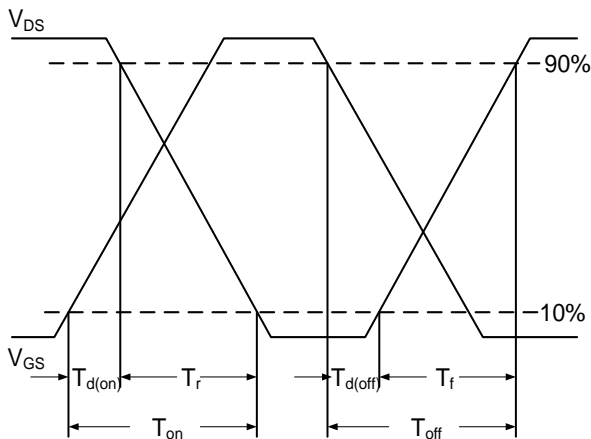


Fig.9 Switching Time Waveform

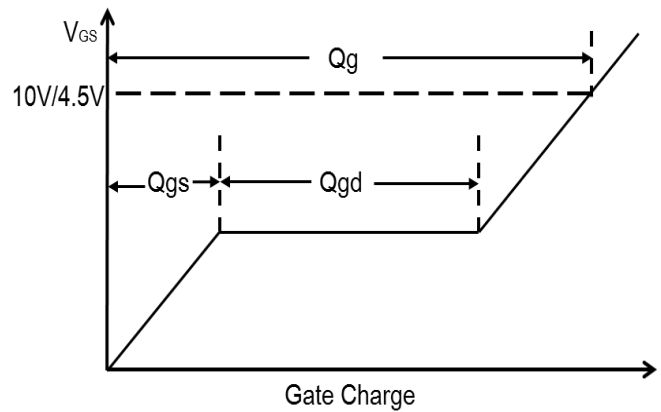
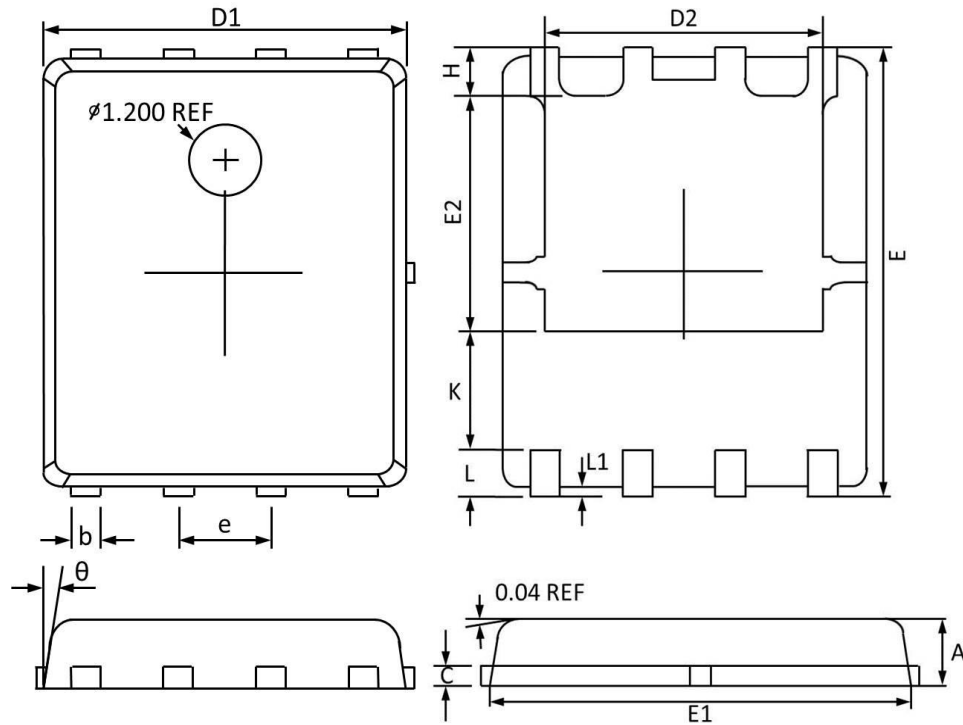


Fig.10 Gate Charge Waveform



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
theta	12°	0°	12°	0°