

### General Description

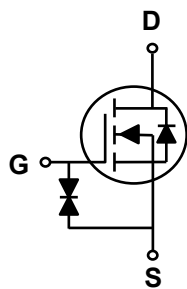
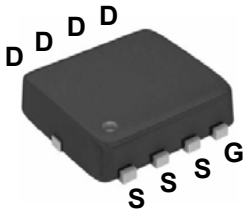
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
20V	10mΩ	30A

### Features

- 20V,30A,  $R_{DS(ON)} = 10m\Omega @ V_{GS} = 10V$
- Improved  $dv/dt$  capability
- ESD Protection Diode Embedded
- Green Device Available

### PPAK3x3 Pin Configuration



### Applications

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



### 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	$\pm 10$	V
$I_D$	Drain Current – Continuous ( $T_c=25^\circ\text{C}$ ) (Chip Limitation)	30	A
	Drain Current – Continuous ( $T_c=100^\circ\text{C}$ ) (Chip Limitation)	19	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup> (Chip Limitation)	120	A
$P_D$	Power Dissipation ( $T_c=25^\circ\text{C}$ )	26	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.21	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	---	4.8	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25\text{ }^\circ\text{C}$ , $I_D=1mA$	---	0.02	---	V/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=20V, V_{GS}=0V, T_J=25\text{ }^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=16V, V_{GS}=0V, T_J=125\text{ }^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 10V, V_{DS}=0V$	---	---	$\pm 100$	nA

**On Characteristics**

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5V, I_D=5A$	---	8	10	$m\Omega$
		$V_{GS}=2.5V, I_D=3A$	---	9.5	12	$m\Omega$
		$V_{GS}=1.8V, I_D=2A$	---	12	17	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	0.3	0.6	1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2	---	$mV/^\circ\text{C}$
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_S=5A$	---	12	---	S

**Dynamic and switching Characteristics**

$Q_g$	Total Gate Charge <sup>2,3</sup>	$V_{DS}=10V, V_{GS}=4.5V, I_D=5A$	---	16.9	26	nC
$Q_{gs}$	Gate-Source Charge <sup>2,3</sup>		---	1.1	3	
$Q_{gd}$	Gate-Drain Charge <sup>2,3</sup>		---	4	7	
$T_{d(on)}$	Turn-On Delay Time <sup>2,3</sup>	$V_{DD}=10V, V_{GS}=4.5V, R_G=25\Omega$ $I_D=1A$	---	6.8	13	ns
$T_r$	Rise Time <sup>2,3</sup>		---	20	38	
$T_{d(off)}$	Turn-Off Delay Time <sup>2,3</sup>		---	41.8	79	
$T_f$	Fall Time <sup>2,3</sup>		---	13.2	25	
$C_{iss}$	Input Capacitance	$V_{DS}=10V, V_{GS}=0V, F=1MHz$	---	1020	1480	pF
$C_{oss}$	Output Capacitance		---	160	240	
$C_{rss}$	Reverse Transfer Capacitance		---	110	160	
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	---	2	4	$\Omega$

**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	$V_{GS}=0V, I_S=1A, T_J=25\text{ }^\circ\text{C}$	---	---	1	V

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.

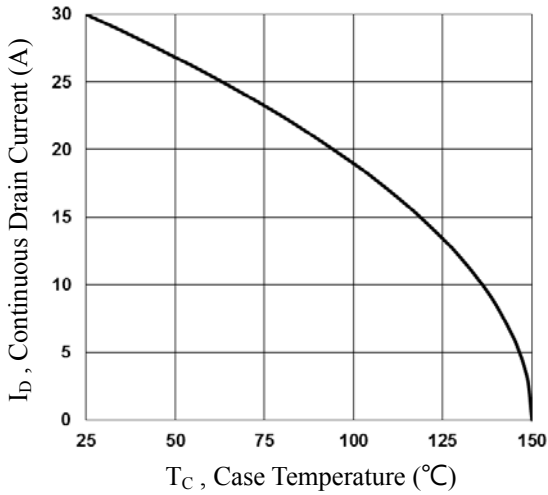


Fig.1 Continuous Drain Current vs.  $T_C$

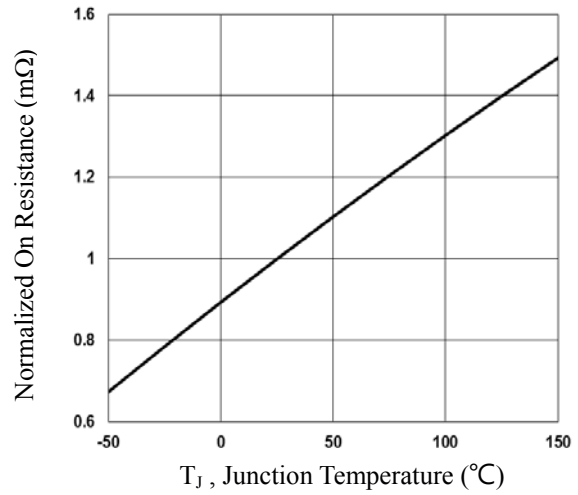


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$

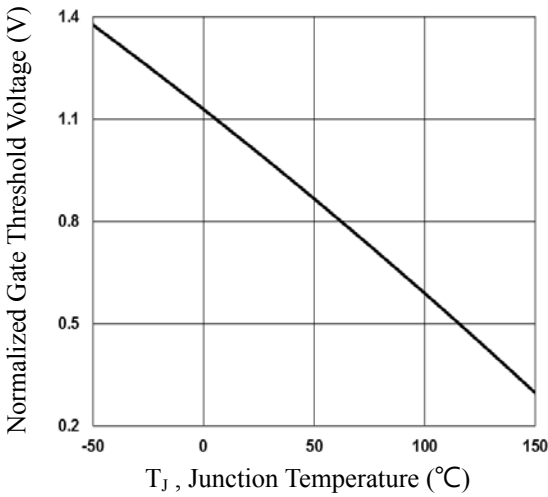


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

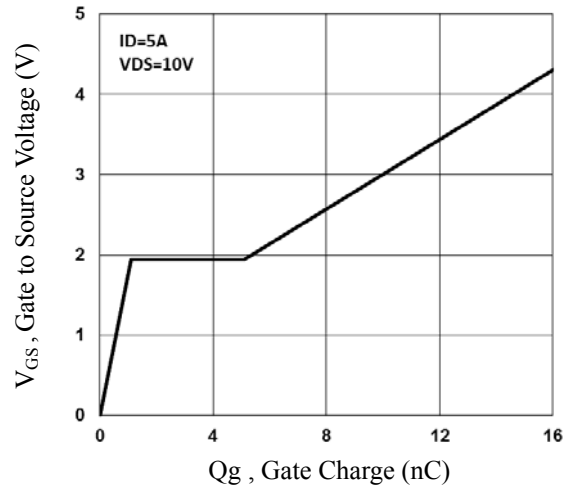


Fig.4 Gate Charge Waveform

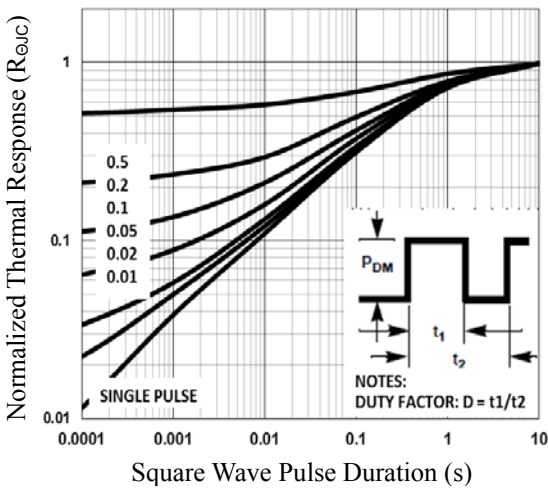


Fig.5 Normalized Transient Response

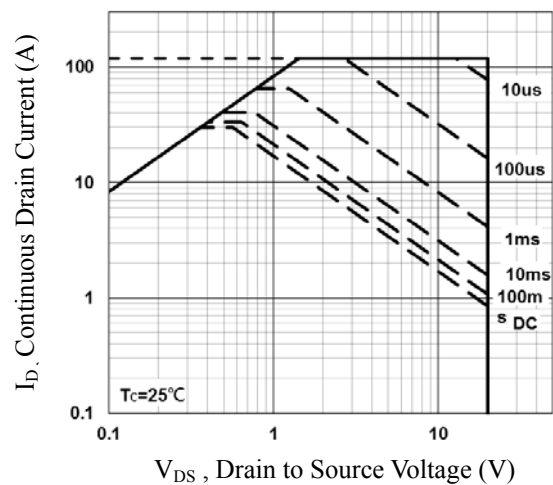


Fig.6 Maximum Safe Operation Area

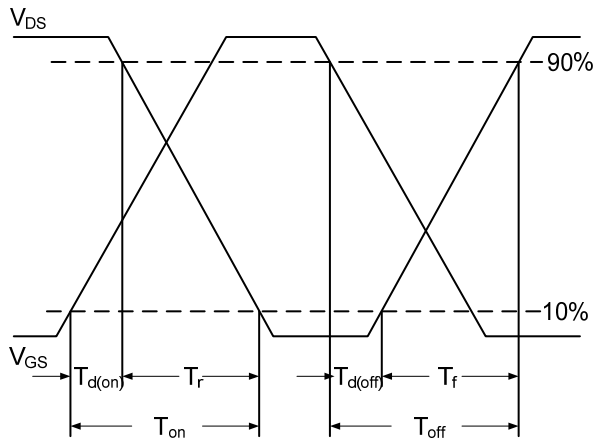


Fig.7 Switching Time Waveform

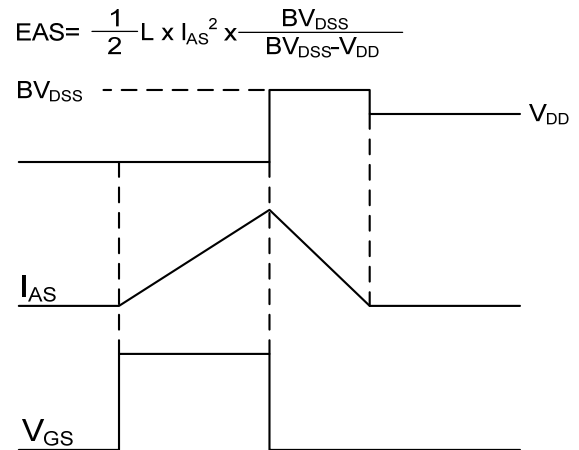
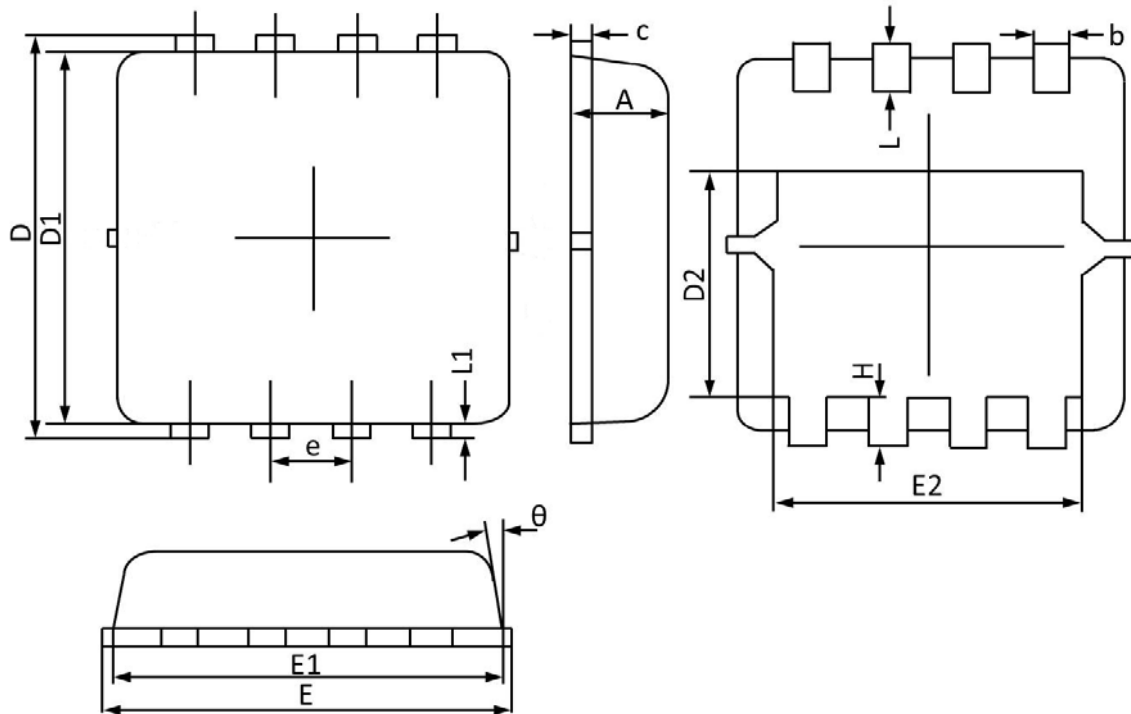


Fig.8 EAS Waveform

## PPAK3x3 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.900	0.700	0.035	0.028
b	0.350	0.240	0.014	0.009
c	0.250	0.100	0.010	0.004
D	3.450	3.050	0.136	0.120
D1	3.200	2.900	0.126	0.114
D2	1.850	1.350	0.073	0.053
E	3.400	3.000	0.134	0.118
E1	3.250	2.900	0.128	0.114
E2	2.600	2.350	0.102	0.093
e	0.65BSC		0.026BSC	
H	0.500	0.300	0.020	0.012
L	0.500	0.300	0.020	0.012
L1	0.200	0.070	0.008	0.003
θ	12°	0°	12°	0°