



60V N-Channel MOSFETs

General Description

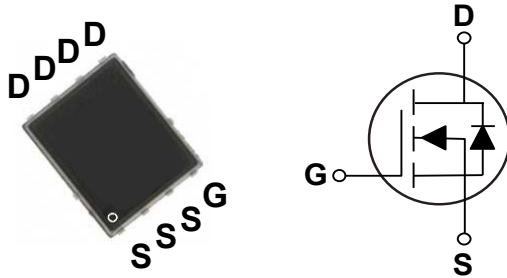
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BV_{DSS}	$R_{DS(ON)}$	I_D
60 V	1.6 m Ω	236 A

Features

- $R_{DS(ON)} \leq 1.6m\Omega @ V_{GS}=10V$
- Fast Switching
- Improved dv/dt Capability
- Green Device Available

PPAK5X6 Pin Configuration



Applications

- Synchronous Rectification in SMPS

Absolute Maximum Ratings $T_J=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous ($T_C=25^\circ C$)	236	A
I_{DM}	Drain Current - Pulsed (NOTE 1)	400	A
IAS	Single Pulse Avalanche Current (L=0.1mH)	60	A
EAS	Single Pulse Avalanche Energy (L=0.1mH)	180	mJ
P_D	Power Dissipation ($T_C=25^\circ C$)	89	W
T_J	Operating Junction Temperature	150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
Marking Code		NG1P6	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	50	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	1.4	$^\circ C/W$



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	60	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =48V, V _{GS} =0V	---	---	1	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A	---	---	1.6	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	2	---	4	V
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =20A	---	75	---	S

Dynamic and switching Characteristics (NOTE 3)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} =10V, I _D =20A	---	85	---	nC
Q _{gs}	Gate-Source Charge		---	16	---	
Q _{gd}	Gate-Drain Charge		---	19	---	
T _{d(on)}	Turn-On Delay Time	V _{DS} =30V, V _{GS} =10V, R _{GEN} =10Ω, I _D =20A	---	20	---	nS
T _r	Rise Time		---	15	---	
T _{d(off)}	Turn-Off Delay Time		---	40	---	
T _f	Fall Time		---	15	---	
C _{iss}	Input Capacitance	V _{DS} =30V, V _{GS} =0V, F=1MHz	---	4800	---	pF
C _{oss}	Output Capacitance		---	1370	---	
C _{rss}	Reverse Transfer Capacitance		---	65	---	
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, F=1MHz	---	1.8	---	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current		---	---	81	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =20A	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =20A, V _R =30V,	---	65	---	nS
Q _{rr}	Reverse Recovery Charge	di _F /dt=100A/us	---	78	---	nC

NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
3. Guaranteed by design, not subject to production testing.



Characteristics Curves

FIG. 1 - I_D vs. T_C

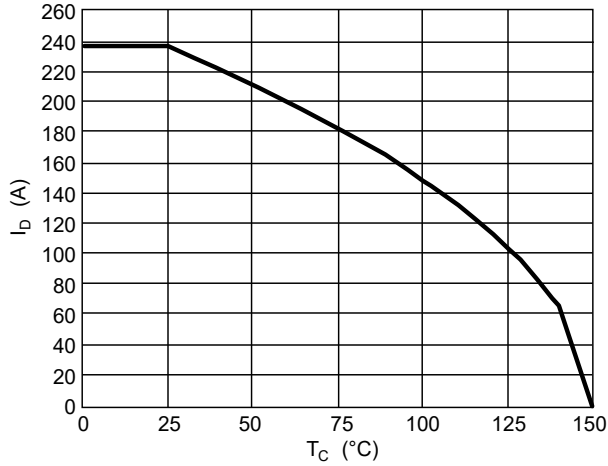


FIG. 2 - Transfer Characteristics

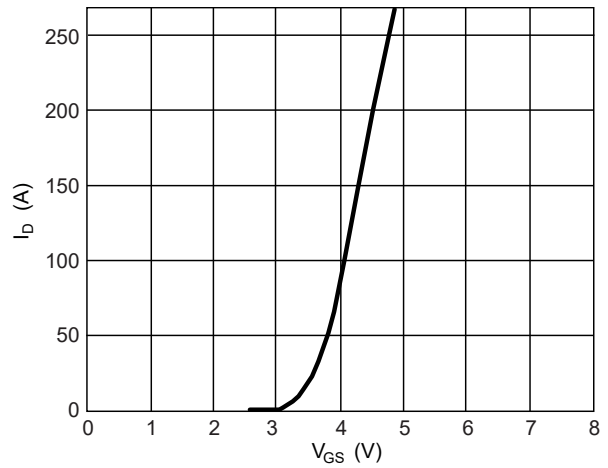


FIG. 3 - $R_{DS(ON)}$ vs. V_{GS}

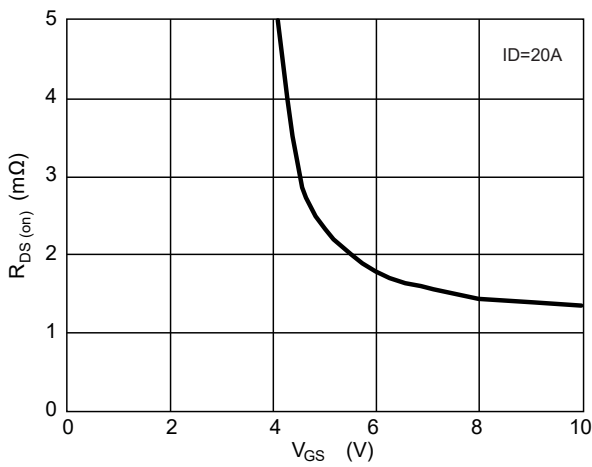


FIG. 4 - Gate Charge Characteristics

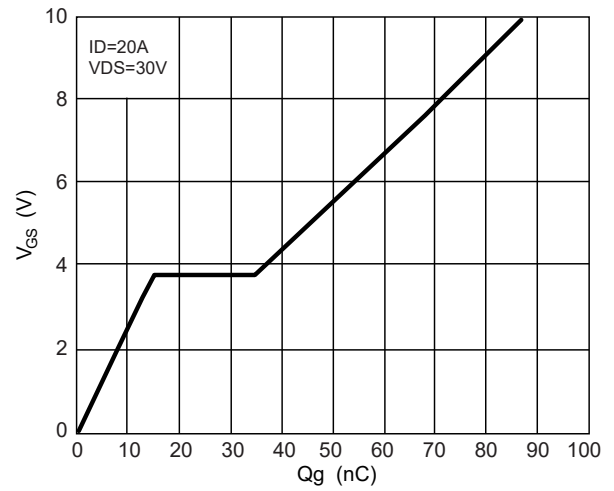


FIG. 5 - Normalized $R_{DS(ON)}$ vs. T_J

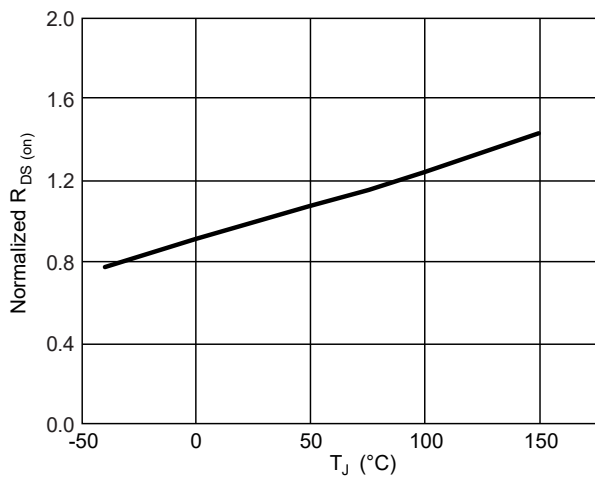
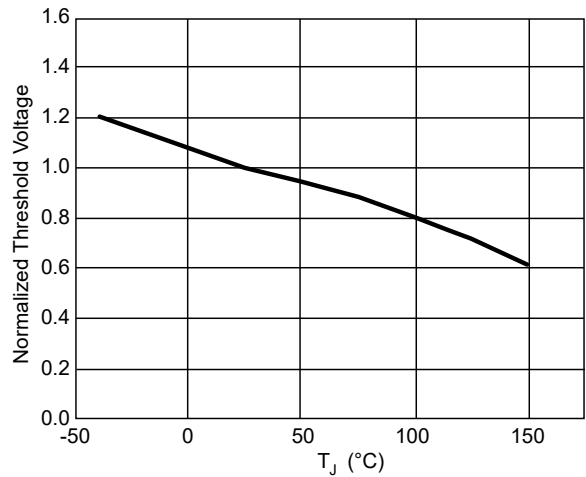


FIG. 6 - Normalized $V_{GS(th)}$ vs. T_J





Characteristics Curves

FIG. 7 - I_S vs. V_{SD}

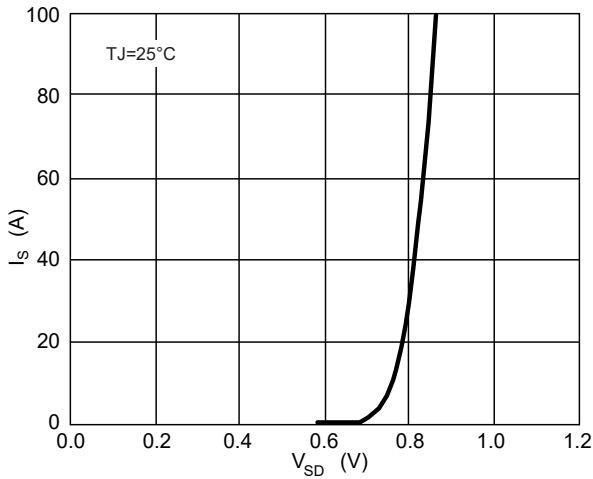
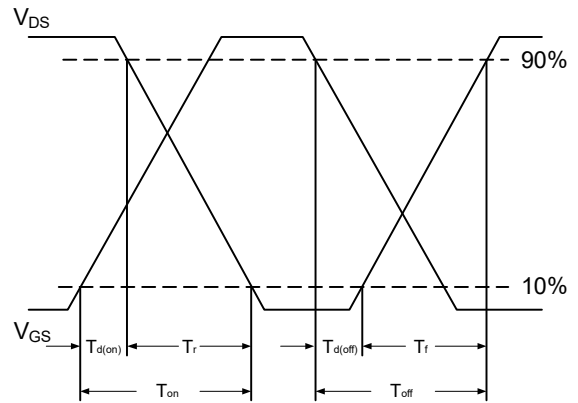
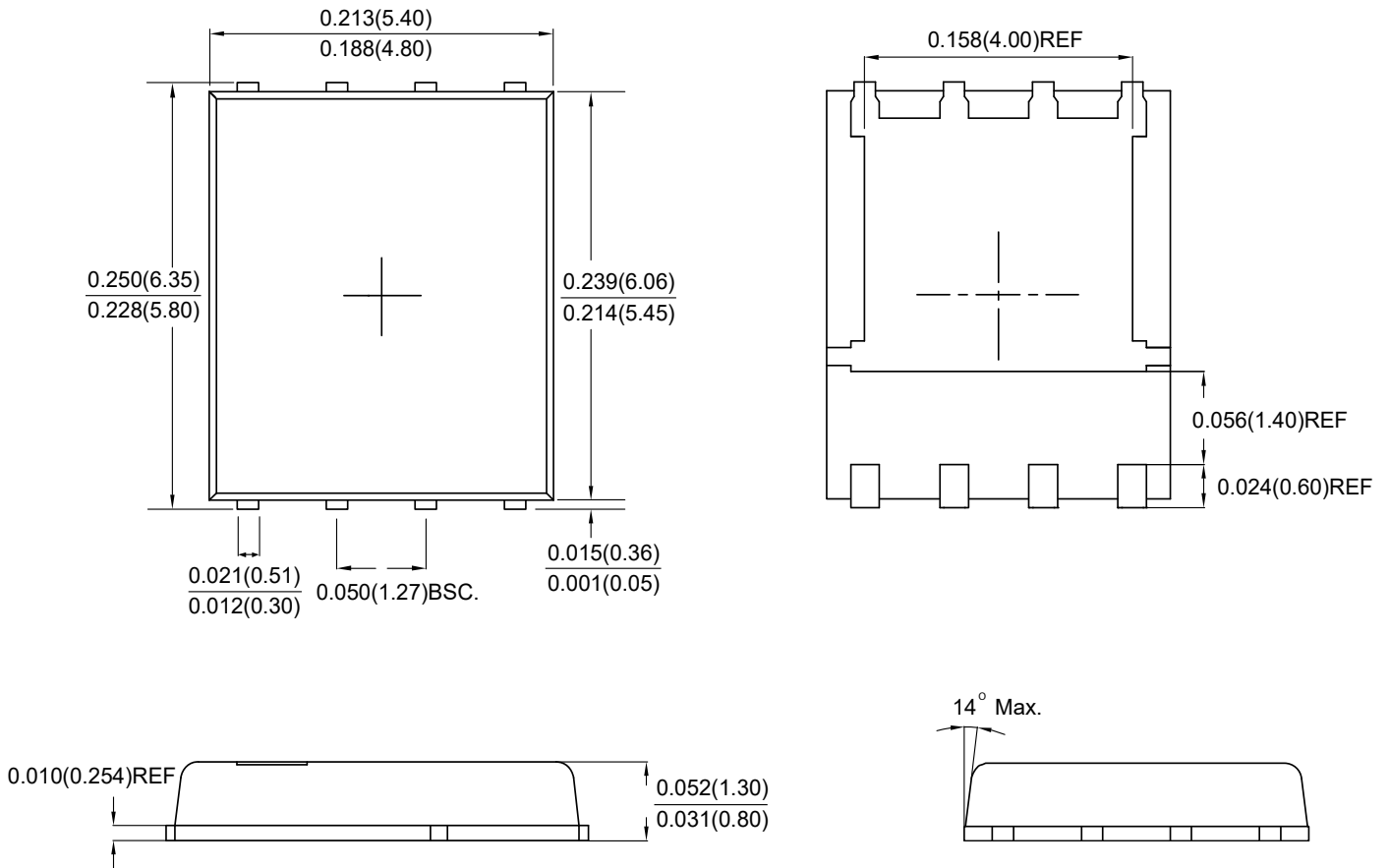


FIG. 8 - Switching Time Waveform



Package Outline Dimensions



PPAK5X6

Dimensions in inches and (millimeters)



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