



# 100V N-Channel MOSFETs

## General Description

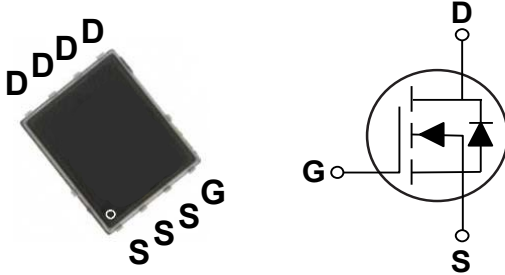
These N-Channel enhancement mode power field effect transistors are using SGT MOSFET technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BV <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub>
100 V	9.9 mΩ	68 A

## Features

- $R_{DS(ON)} \leq 9.9m\Omega @ V_{GS}=10V$
- Fast Switching
- Improved dv/dt Capability
- Green Device Available

PPAK5X6 Pin Configuration



## Applications

- Synchronous Rectification
- DC/DC Converter
- Battery Management

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

Symbol	Parameter	Value	Units
V <sub>DS</sub>	Drain-Source Voltage	100	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current - Continuous ( $T_c=25^\circ\text{C}$ )	68	A
I <sub>DM</sub>	Drain Current - Pulsed (NOTE 1)	272	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	180	mJ
P <sub>D</sub>	Power Dissipation ( $T_c=25^\circ\text{C}$ )	96.1	W
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
Marking Code		NM9P9	

## Thermal Characteristics

Symbol	Parameter	Value	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to Ambient	55	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction to Case	1.3	°C/W



### Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

#### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	100	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA

#### On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	---	9.9	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2	---	4	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =20A	---	50	---	S

#### Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	59	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	9.5	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	13.8	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω, I <sub>D</sub> =20A	---	14.2	---	nS
T <sub>r</sub>	Rise Time		---	28.5	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	57.6	---	
T <sub>f</sub>	Fall Time		---	13.3	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, F=1MHz	---	3520	---	pF
C <sub>oss</sub>	Output Capacitance		---	300	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	20	---	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	---	1.3	---	Ω

#### Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	68	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =20A	---	---	1.2	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, di/dt=200A/us	---	34	---	nS
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		---	55	---	nC

#### NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.4mH, I<sub>AS</sub>=30A.
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.



Characteristics Curves

FIG. 1-Transfer Characteristics

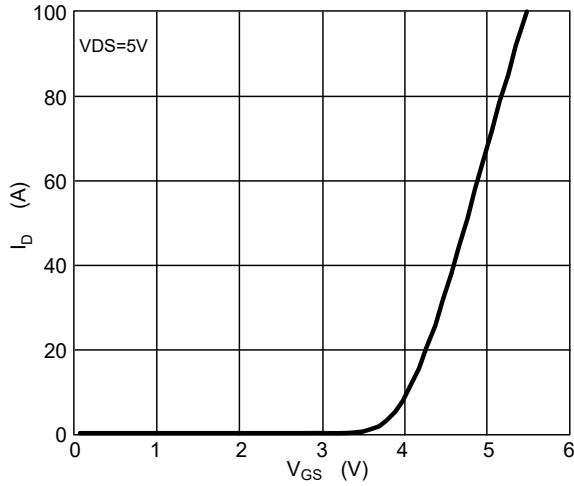


FIG. 2- $I_S$  vs  $V_{SD}$

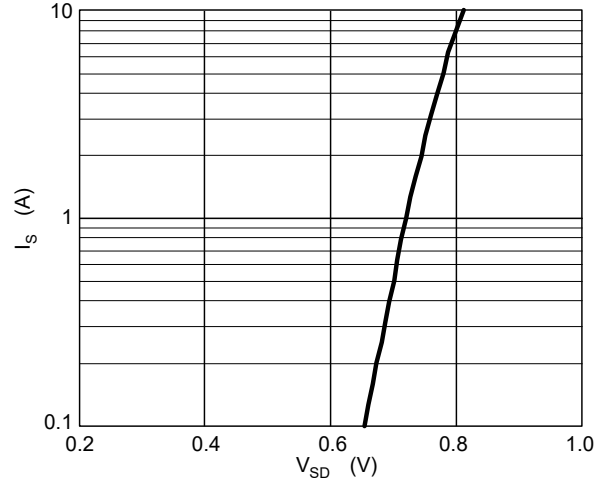


FIG. 3- $R_{DS(on)}$  vs  $I_D$

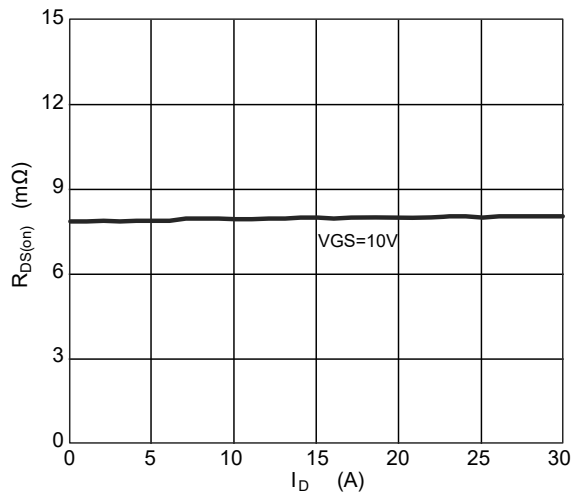


FIG. 4-Normalized  $R_{DS(on)}$  vs  $T_J$

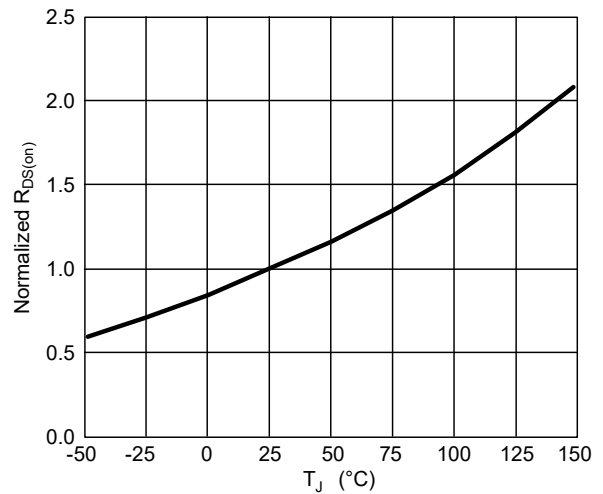


FIG. 5-Gate Charge Characteristics

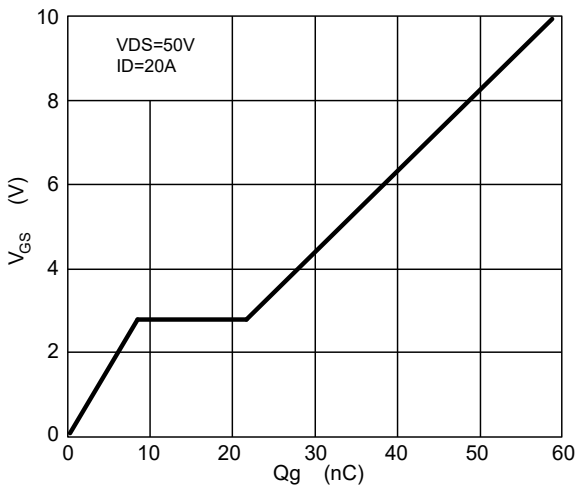
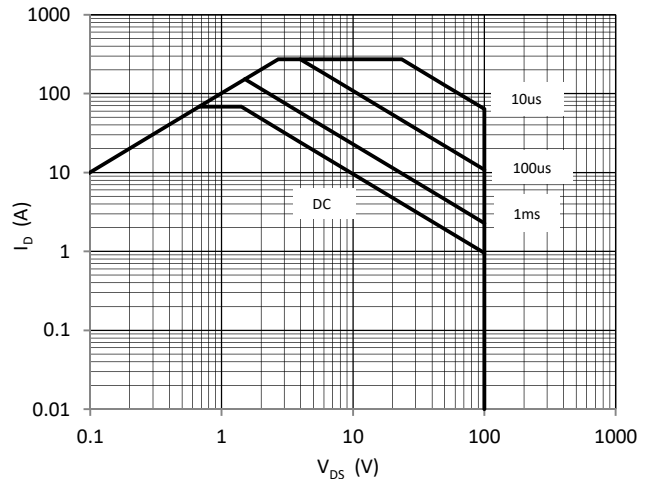


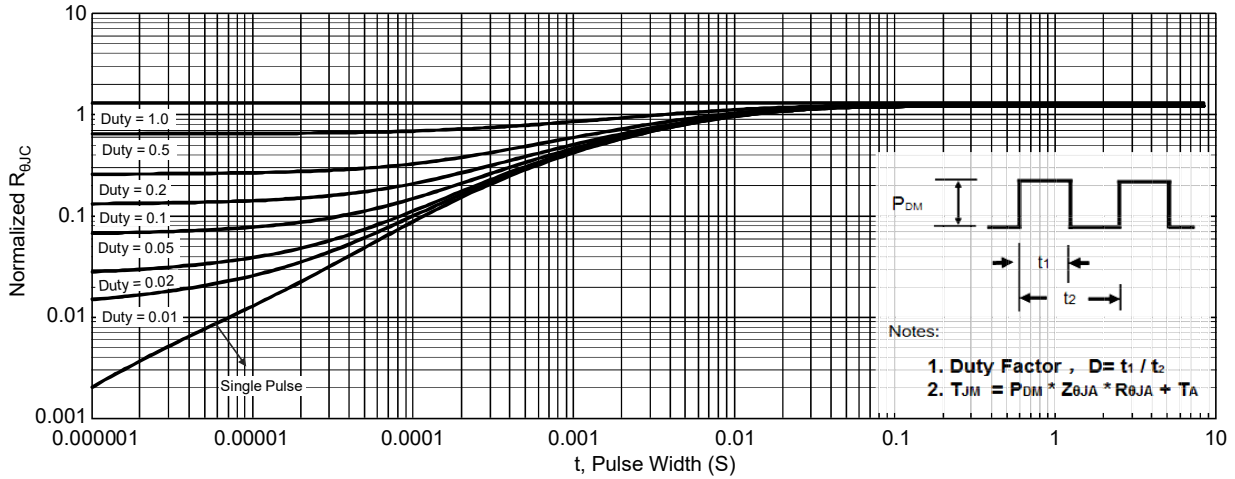
FIG. 6-Safe Operating Area



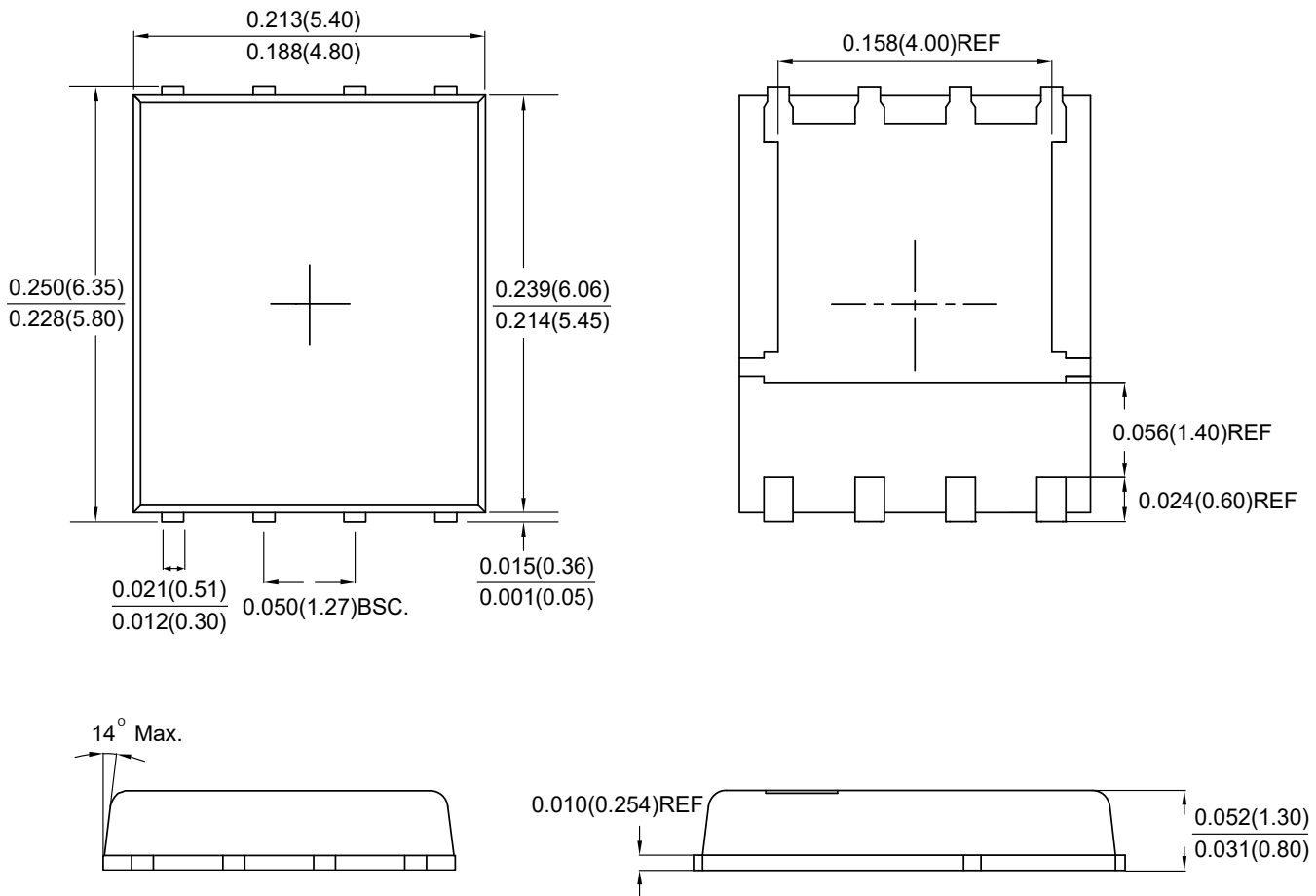


### Characteristics Curves

FIG. 7-Transient Thermal Impedance



### Package Outline Dimensions



### PPAK5X6

Dimensions in inches and (millimeters)



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