



60V Dual N-Channel MOSFETs

General Description

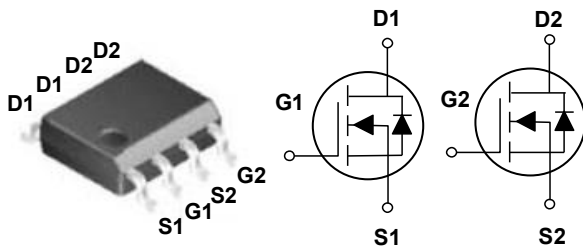
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BV_{DSS}	$R_{DS(ON)}$	I_D
60 V	40 mΩ	4.5 A

Features

- $R_{DS(ON)} \leq 40m\Omega @ V_{GS}=10V$
- Improved dv/dt Capability
- Fast Switching
- Green Device Available

SOP-8 Pin Configuration



Applications

- Battery Powered System
- Portable Equipment

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 ($T_A=25^\circ C$)	4.5	A
I_{DM}	Drain Current - Pulsed (NOTE 1) ($T_A=25^\circ C$)	11	A
EAS	Single Pulse Avalanche Energy (L=0.1mH)	6	mJ
IAS	Single Pulse Avalanche Current (L=0.1mH)	11	A
P_D	Power Dissipation ($T_A=25^\circ C$)	1.5	W
T_J	Operating Junction Temperature Range	-50 to 150	$^\circ C$
T_{STG}	Storage Temperature Range	-50 to 150	$^\circ C$
Marking Code		NG040	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	85	$^\circ C/W$

**60V Dual N-Channel MOSFETs****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 (NOTE 2)	V _{GS} =10V, I _D =6A	---	---	40	mΩ
		V _{GS} =4.5V, I _D =5.5A	---	---	47	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.8	2.5	V
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =3A	---	10	---	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 =6A	---	26	---	nC
Q _{gs}	Gate-Source Charge		---	4	---	
Q _{gd}	Gate-Drain Charge		---	4.8	---	
T _{d(on)}	Turn-On Delay Time	V _{DS} =30V, V _{GS} =10V, R _{GEN} =6Ω, I _D =1A	---	6.2	---	nS
T _r	Rise Time		---	22	---	
T _{d(off)}	Turn-Off Delay Time		---	45	---	
T _f	Fall Time		---	21	---	
C _{iss}	Input Capacitance	V _{DS} =30V, V _{GS} =0V, F=1MHz	---	1108	---	pF
C _{oss}	Output Capacitance		---	60	---	
C _{rss}	Reverse Transfer Capacitance		---	43	---	
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	---	3.8	---	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{SD}	Diode Forward Voltage (NOTE 2)	V _{GS} =0V, I _S =3A	---	---	1.1	V
t _{rr}	Reverse Recovery Time	V _R =0V, I _F =3A, dI/dt=100A/us	---	20	---	nS
Q _{rr}	Reverse Recovery Charge		---	16	---	nC

NOTES :

1. Max. current is limited by junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Guaranteed by design, not subject to production testing.



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Characteristics Curves

FIG. 1-Drain Current

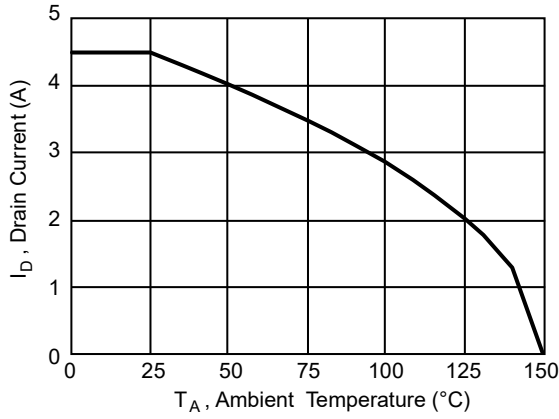


FIG. 2-Normalized $R_{DS(ON)}$ vs. T_J

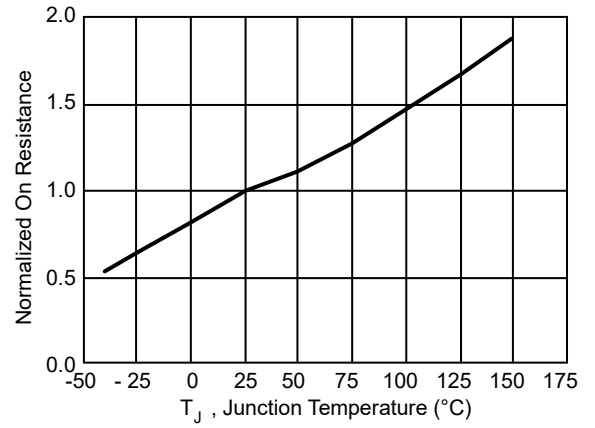


FIG. 3-Normalized V_{th} vs. T_J

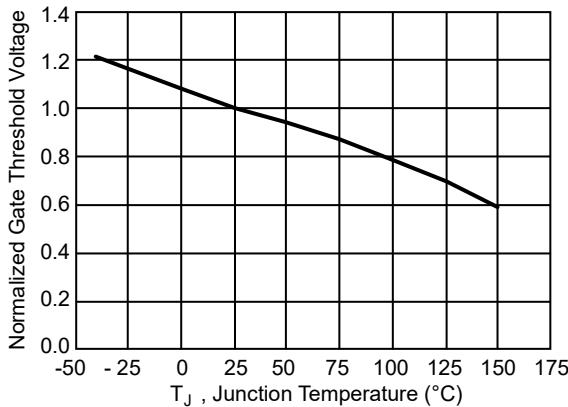


FIG. 4-Gate Charge Characteristics

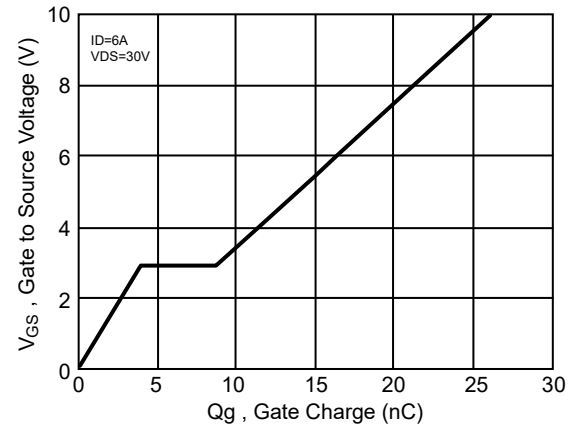


FIG. 5- $R_{\theta JA}$ Transient Thermal Impedance

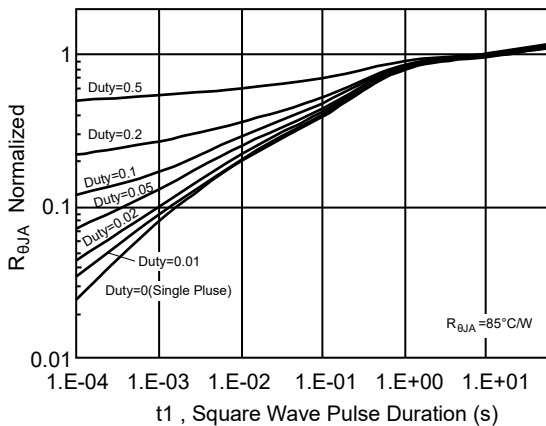
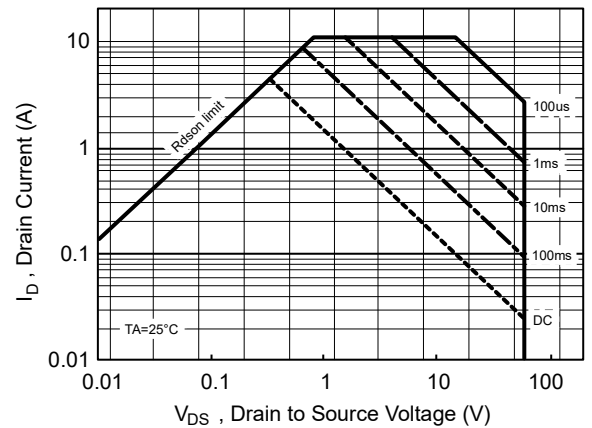
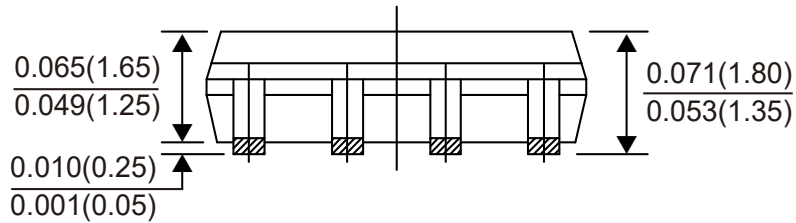
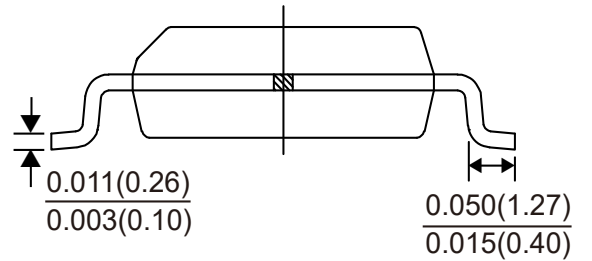
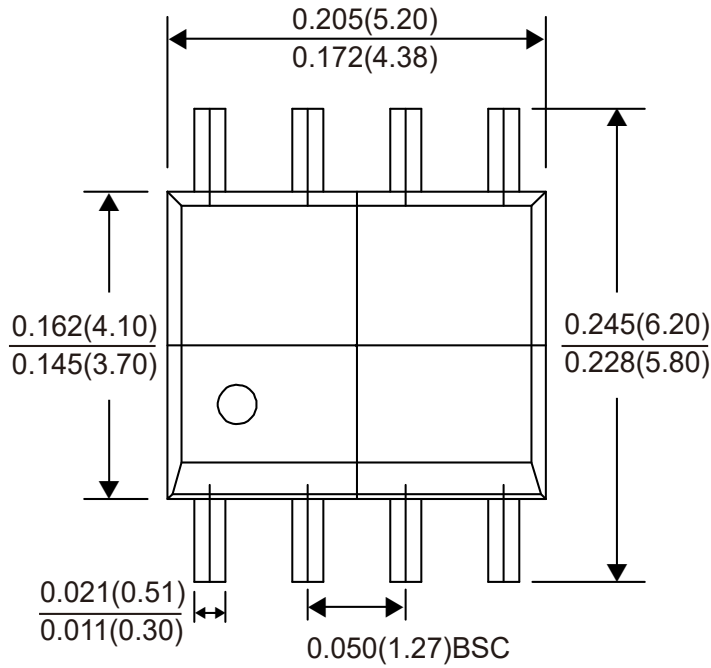


FIG. 6-Safe Operation Area





Package Outline Dimensions



SOP-8

Dimensions in inches and (millimeters)



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