



## 200V N-Channel MOSFETs

### General Description

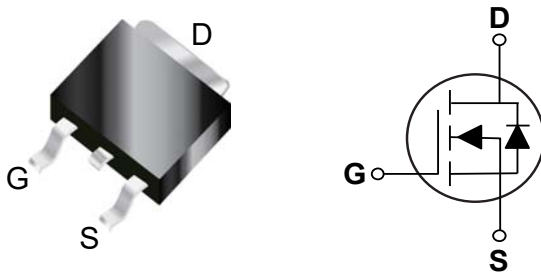
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
200 V	20 m $\Omega$	75 A

### Features

- $R_{DS(ON)} \leq 20m\Omega @ V_{GS}=10V$
- Fast Switching
- Green Device Available

TO-263 Pin Configuration



### Applications

- Load Switch
- PWM Application
- Power Management

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	200	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Drain Current – Continuous ( $T_A=25^\circ C$ )	75	A
$I_{DM}$	Drain Current – Pulsed (NOTE 1)	250	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	300	mJ
$P_D$	Power Dissipation ( $T_C=25^\circ C$ )	125	W
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
Marking Code		NS020	

### Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	60	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	1	$^\circ C/W$

**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	200	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =200V, 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> =40A	---	---	20	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	3.6	---	5.0	V

**Dynamic and switching Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =40A	---	85	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	15	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	25	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DS</sub> =50V, R <sub>G</sub> =2.5Ω, I <sub>D</sub> =40A, V <sub>GS</sub> =10V	---	45	---	nS
T <sub>r</sub>	Rise Time		---	70	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	110	---	
T <sub>f</sub>	Fall Time		---	90	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz	---	7500	---	pF
C <sub>oss</sub>	Output Capacitance		---	500	---	
C <sub>riss</sub>	Reverse Transfer Capacitance		---	210	---	

**Drain-Source Diode Characteristics and Ratings**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Body Diode Current		---	---	75	A
I <sub>SM</sub>	Pulsed Diode Forward Current		---	---	150	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =40A	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =30A, V <sub>DD</sub> =50V,	---	110	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge	dI <sub>F</sub> /dt=100A/us	---	0.55	---	uC

**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>=50V, L=0.3mH, R<sub>G</sub>=25Ω, V<sub>GS</sub>=10V.
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-  $I_D$  vs.  $T_A$

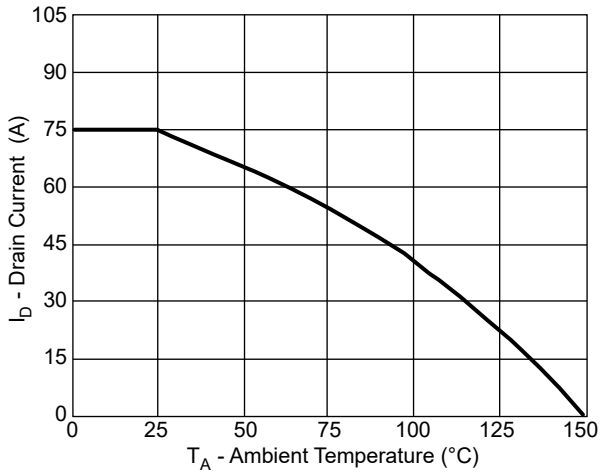


FIG. 2- Normalized  $BV_{DSS}$  vs.  $T_J$

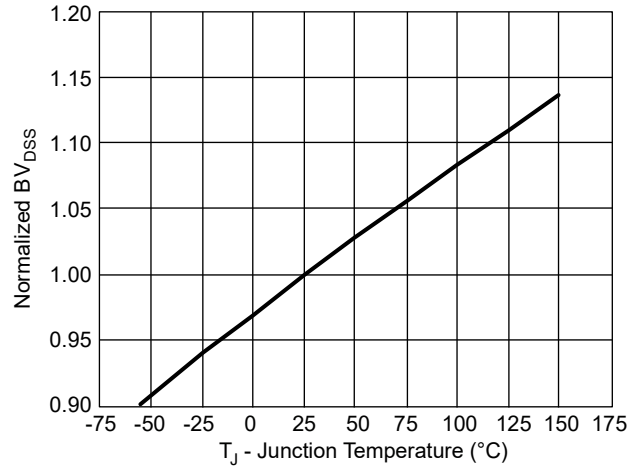


FIG. 3- Normalized  $R_{DS(ON)}$  vs.  $T_J$

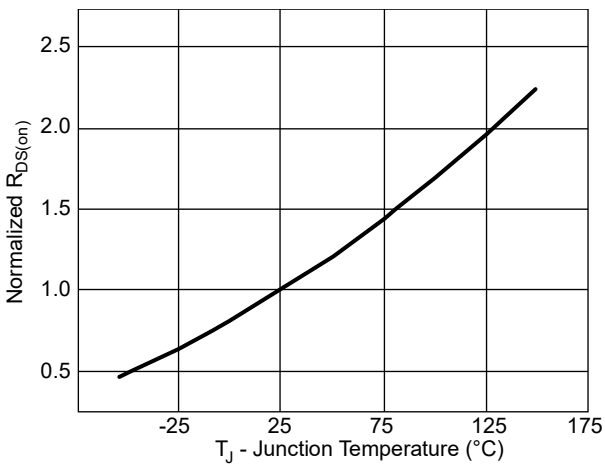


FIG. 4- Transfer Characteristics

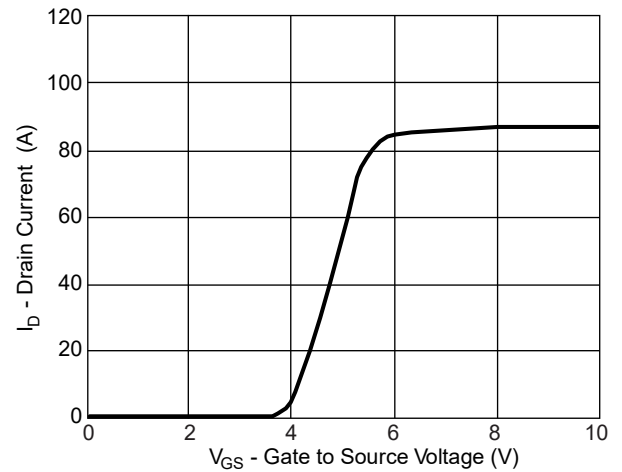


FIG. 5- Drain-Source Diode Forward

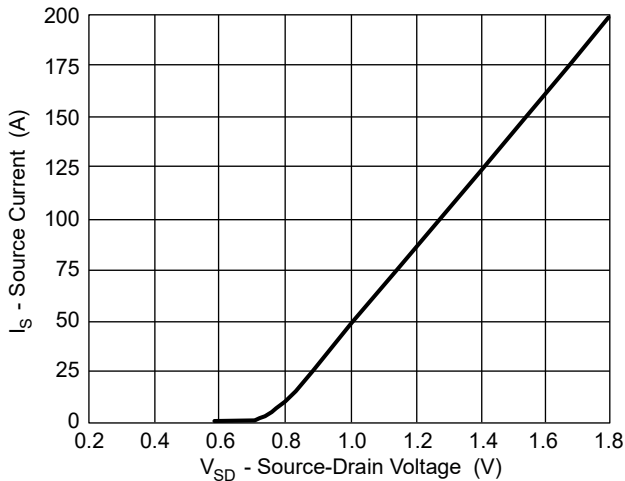
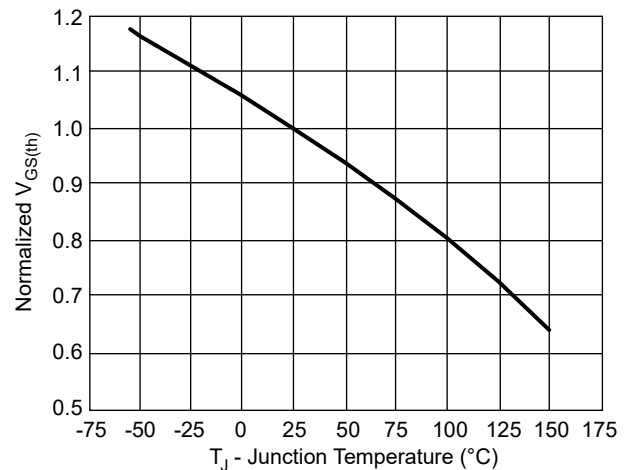


FIG. 6- Normalized  $V_{GS(th)}$  vs.  $T_J$





Characteristics Curves

FIG. 7- Safe Operating Area

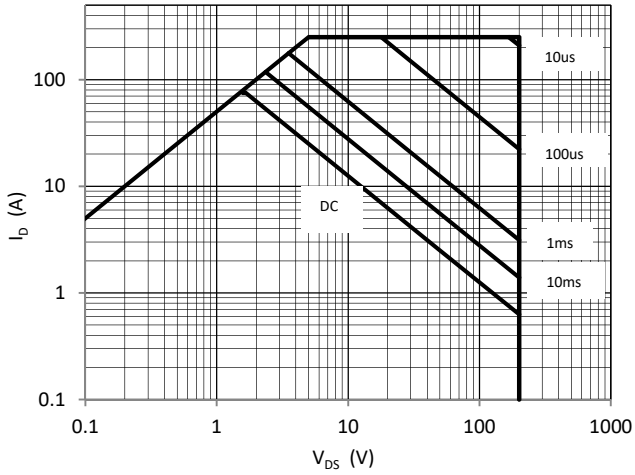


FIG. 8- Switching Time Waveform

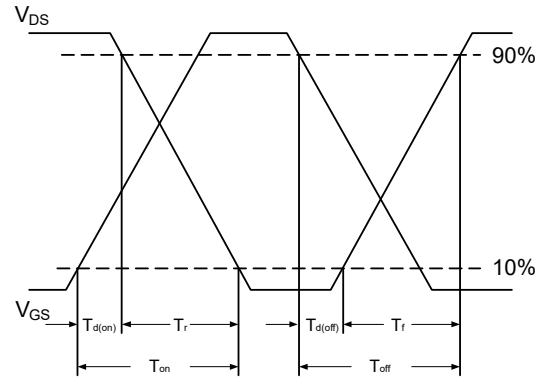
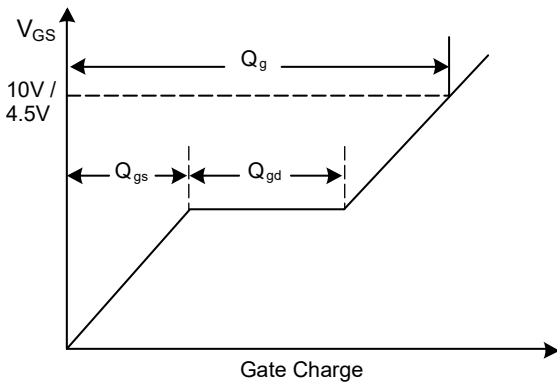
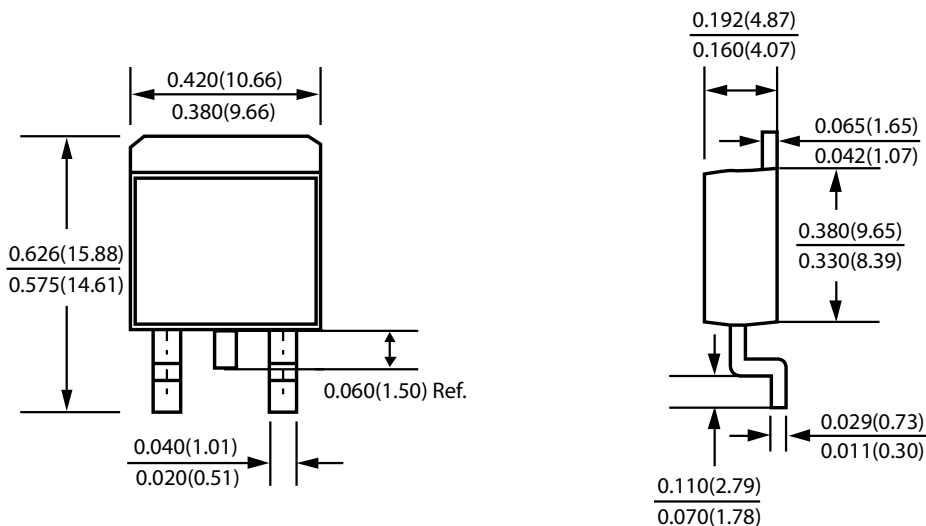


FIG. 9- Gate Charge Waveform



Package Outline Dimensions



TO-263

Dimensions in inches and (millimeters)



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