



General Description

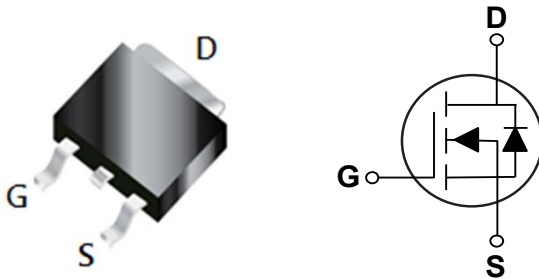
D1MNM020 use advanced SGT MOSFET technology to provide low $R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics.

BV_{DSS}	$R_{DS(ON)}$	I_D
100 V	20 m Ω	40 A

Features

- $R_{DS(ON)} \leq 20m\Omega @ V_{GS}=10V$
- Extremely Low Switching Loss
- Excellent Stability and Uniformity or Invertors

TO-252 Pin Configuration



Applications

- Consumer Electronic Power Supply
- Motor Control
- Synchronous-Rectification
- Isolated DC

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous ($T_C=25^\circ\text{C}$) (NOTE 1)	40	A
I_{DM}	Drain Current - Pulsed ($T_C=25^\circ\text{C}$) (NOTE 2)	120	A
P_D	Power Dissipation ($T_C=25^\circ\text{C}$) (NOTE 3)	72	W
E_{AS}	Single Pulse Avalanche Energy (NOTE 4)	30	mJ
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
Marking Code		NM020 , APG40N10D	

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	1.74	$^\circ\text{C/W}$



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

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	100	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=100V, V_{GS}=0V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=8A$	---	---	20	m Ω
		$V_{GS}=4.5V, I_D=6A$	---	---	26	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	---	2.5	V

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	$V_{DS}=50V, V_{GS}=10V, I_D=8A$	---	19.8	---	nC
Q_{gs}	Gate-Source Charge		---	2.4	---	
Q_{gd}	Gate-Drain Charge		---	5.3	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DS}=50V, V_{GS}=10V, R_G=2.2\Omega, I_D=10A$	---	17.8	---	nS
T_r	Rise Time		---	3.9	---	
$T_{d(off)}$	Turn-Off Delay Time		---	33.5	---	
T_f	Fall Time		---	3.2	---	
C_{iss}	Input Capacitance	$V_{DS}=50V, V_{GS}=0V, f=1\text{MHz}$	---	1190.6	---	pF
C_{oss}	Output Capacitance		---	194.6	---	
C_{riss}	Reverse Transfer Capacitance		---	4.1	---	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Diode forward current	$V_G=V_D=0V, \text{ Force Current}$	---	---	40	A
I_{SM}	Pulsed Source Current		---	---	120	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=8A$	---	---	1.3	V
t_{rr}	Reverse Recovery Time	$I_S=8A, di/dt=100A/\mu s$	---	50.2	---	ns
Q_{rr}	Reverse Recovery Charge		---	95.1	---	nC
I_{rrm}	Peak Reverse Recovery Current		---	2.5	---	A

NOTES :

1. Calculated continuous current based on maximum allowable junction temperature.
2. Repetitive rating : pulse width limited by max. junction temperature.
3. P_d is based on max. junction temperature, using junction-case thermal resistance.
4. $V_{DD}=50V, R_G=25\Omega, L=0.3mH$, starting $T_J=25^\circ\text{C}$.



Characteristics Curves

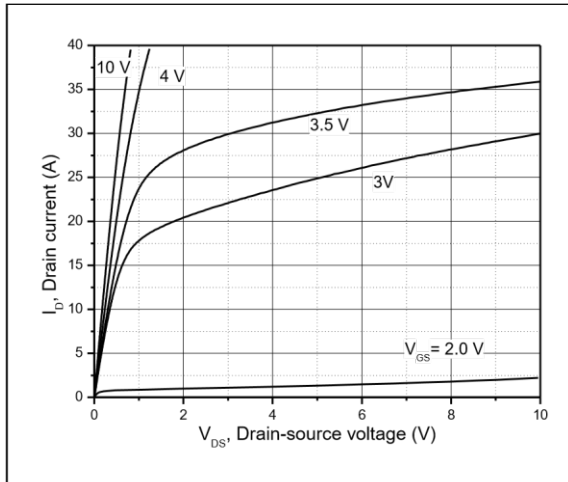


Figure 1, Typ. output characteristics

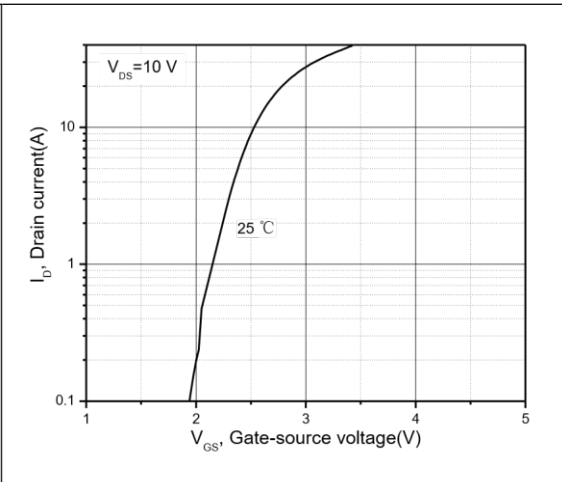


Figure 2, Typ. transfer characteristics

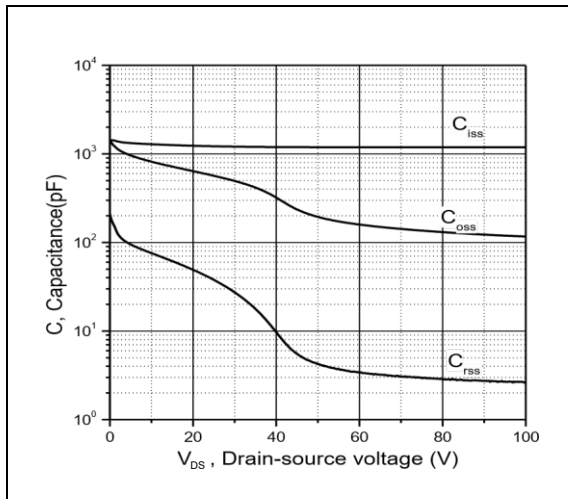


Figure 3, Typ. capacitances

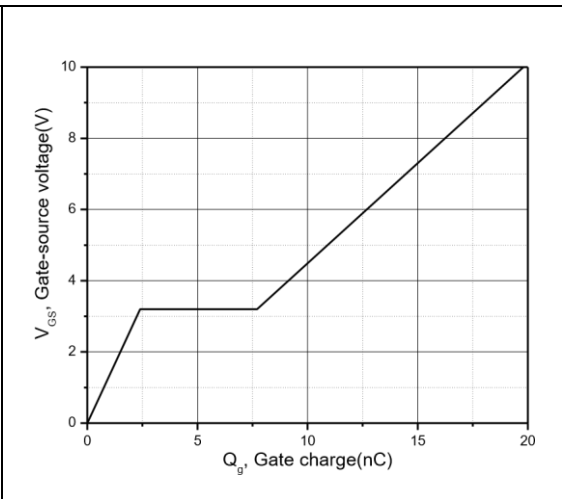


Figure 4, Typ. gate charge

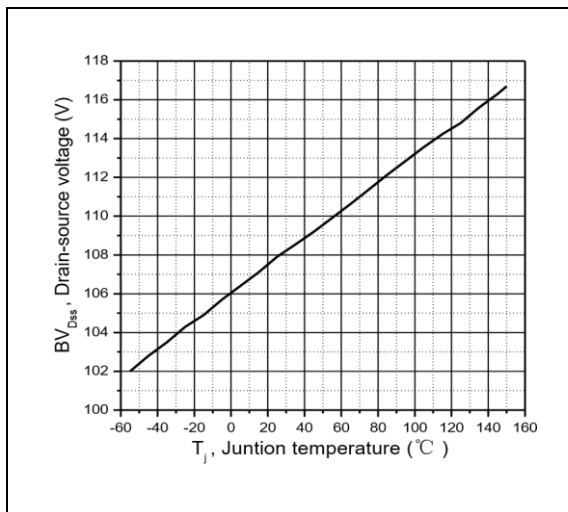


Figure 5, Drain-source breakdown voltage

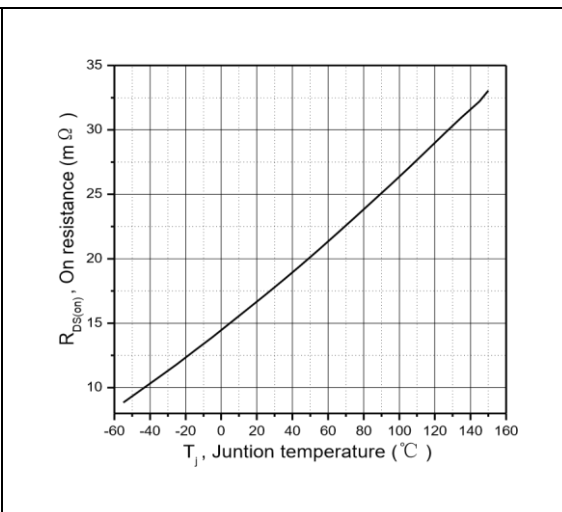


Figure 6, Drain-source on-state resistance



Characteristics Curves

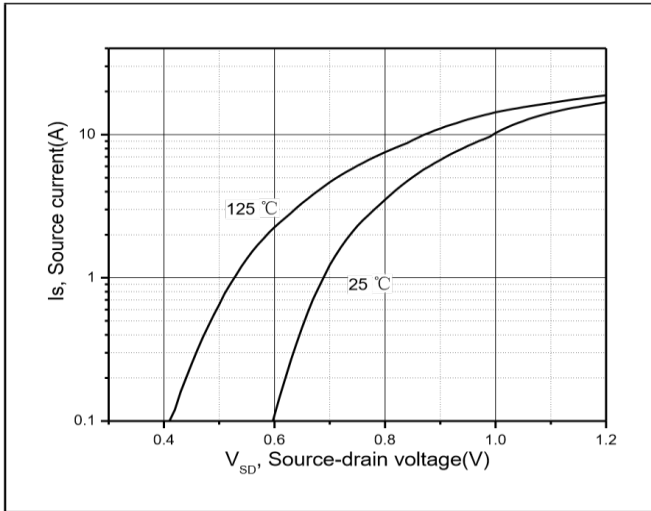


Figure 7, Forward characteristic of body diode

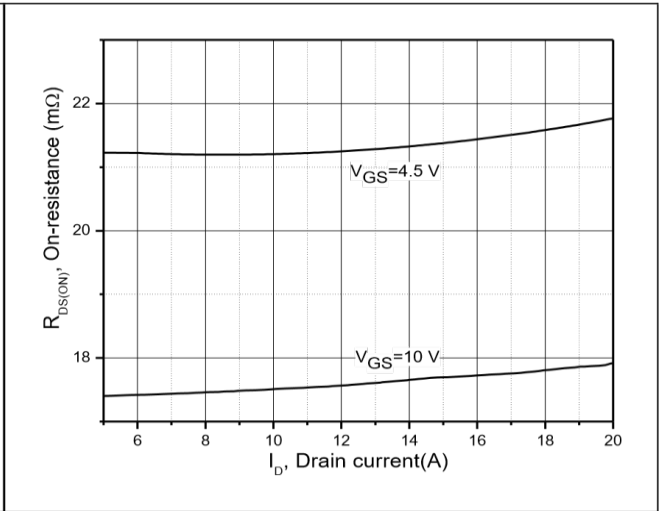


Figure 8, Drain-source on-state resistance

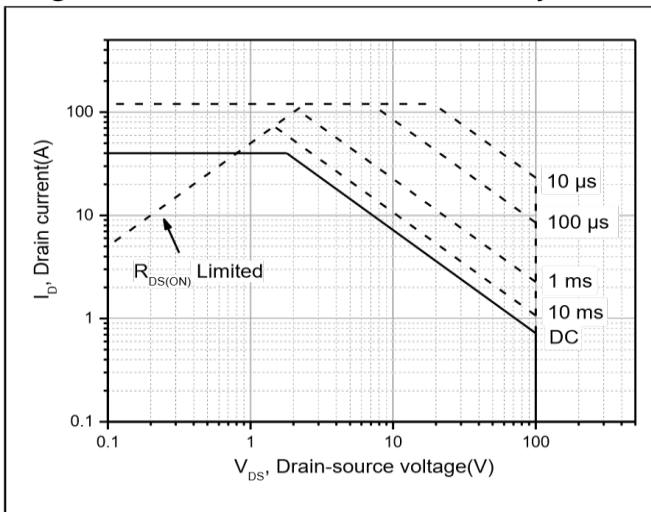
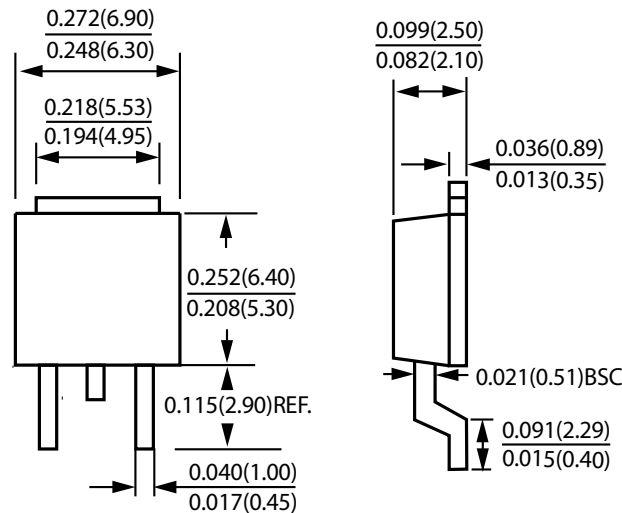


Figure 9, Safe operation area $T_C=25\text{ }^\circ\text{C}$

Package Outline Dimensions



TO-252

Dimensions in inches and (millimeters)



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