

# N2M0060065D

## Silicon Carbide Power MOSFET

### N-Channel Enhancement Mode

#### Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

#### Benefits

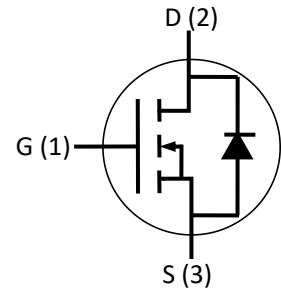
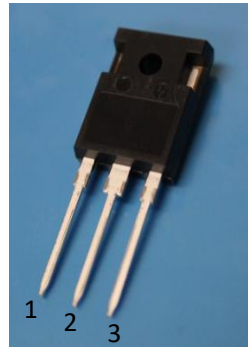
- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

#### Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives

- Pulsed Power applications

#### Package



Part Number	Package
N2M0060065D	TO-247-3

#### Maximum Ratings ( $T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DSmax}$	Drain - Source Voltage	650	V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GSmax}$	Gate - Source Voltage	-10/+25	V	Absolute maximum values	
$V_{GSop}$	Gate - Source Voltage	-5/+20	V	Recommended operational values	
$I_D$	Continuous Drain Current	30 22	A	$V_{GS}=20V, T_c=25^\circ\text{C}$ $V_{GS}=20V, T_c=100^\circ\text{C}$	
$P_D$	Power Dissipation	171	W	$T_c=25^\circ\text{C}, T_J=150^\circ\text{C}$	Fig. 10
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$		

## Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650			V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GS(th)}$	Gate Threshold Voltage	1.80	2.30	3.50	V	$V_{GS}=V_{DS}, I_{DS}=5mA, T_C=25^\circ C$	Fig. 6
			1.55			$V_{GS}=V_{DS}, I_{DS}=5mA, T_C=175^\circ C$	
$I_{DSS}$	Zero Gate Voltage Drain Current		2	100	$\mu A$	$V_{DS}=650V, V_{GS}=0V$	
$I_{GSS}$	Gate-Source Leakage Current		50	200	nA	$V_{GS}=20V, V_{DS}=0V$	
$R_{DS(on)}$	Drain-Source on-state Resistance		65	80	m $\Omega$	$V_{GS}=20V, I_D=20A, T_C=25^\circ C$	Fig. 4
			95			$V_{GS}=20V, I_D=20A, T_C=175^\circ C$	
$g_{fs}$	Transconductance		4.7		S	$V_{GS}=20V, I_D=20A, T_J=25^\circ C$	Fig. 5
			5.9			$V_{GS}=20V, I_D=20A, T_J=175^\circ C$	
$C_{iss}$	Input Capacitance		1700		pF	$V_{GS}=0V, V_{DS}=1000V, f=1MHz$ $V_{AC}=25mV$	Fig. 8
$C_{oss}$	Output Capacitance		172				
$C_{rss}$	Reverse Transfer Capacitance		77				
$E_{ON}$	Turn-On Switching Energy		140		$\mu J$	$V_{DS}=400V, V_{GS}=-5/20V, I_D=10A,$ $R_{G(ext)}=5\Omega, L=142\mu H$	
$E_{OFF}$	Turn-Off Switching Energy		32				
$t_{d(on)}$	Turn-On Delay Time		15		ns	$V_{DD}=400V, V_{GS}=-0/20V$ $I_D=10A, R_{G(ext)}=5\Omega,$ $R_L=40\Omega, \text{Timing relative to } V_{DS}$	
$t_r$	Rise Time		45				
$t_{d(off)}$	Turn-Off Delay Time		13				
$t_f$	Fall Time		10				
$R_{G(int)}$	Internal Gate Resistance		2.0		$\Omega$	$f=1MHz, V_{AC}=25mV$	
$Q_{gs}$	Gate to Source Charge		18		nC	$V_{DD}=400V, V_{GS}=-0/20V$ $I_D=10A$	Fig. 9
$Q_{gd}$	Gate to Drain Charge		19				
$Q_g$	Total Gate Charge		65				

## Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_{SD}$	Diode Forward Voltage	5.5		V	$V_{GS}=-5V, I_{SD}=6.6A, T_J=25^\circ C$	Fig. 7
		5.0		V	$V_{GS}=-5V, I_{SD}=6.6A, T_J=175^\circ C$	
$I_S$	Continuous Diode Forward Current		30	A	$T_C=25^\circ C$	
$t_{rr}$	Reverse Recovery time	16		ns	$V_{GS}=-5V, I_{SD}=20A, V_R=400V,$ $dif/dt=1200A/\mu s;$	
$Q_{rr}$	Reverse Recovery Charge	80		nC		
$I_{rrm}$	Peak Reverse Recovery Current	9.0		A		

## Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.73	$^\circ C/W$		Fig. 11
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	35			

## Typical Performance

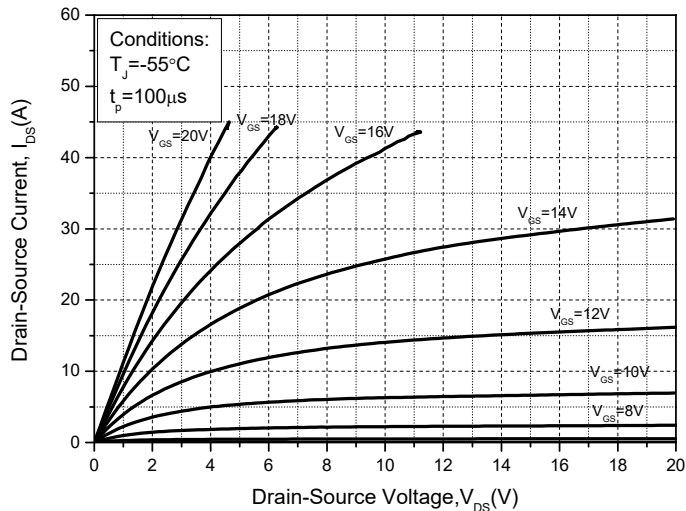


Figure 1. Output Characteristics  $T_J = -40^\circ\text{C}$

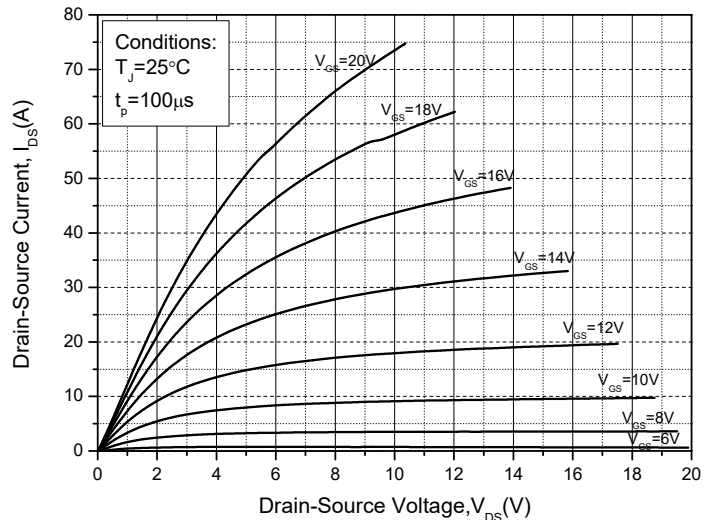


Figure 2. Output Characteristics  $T_J = 25^\circ\text{C}$

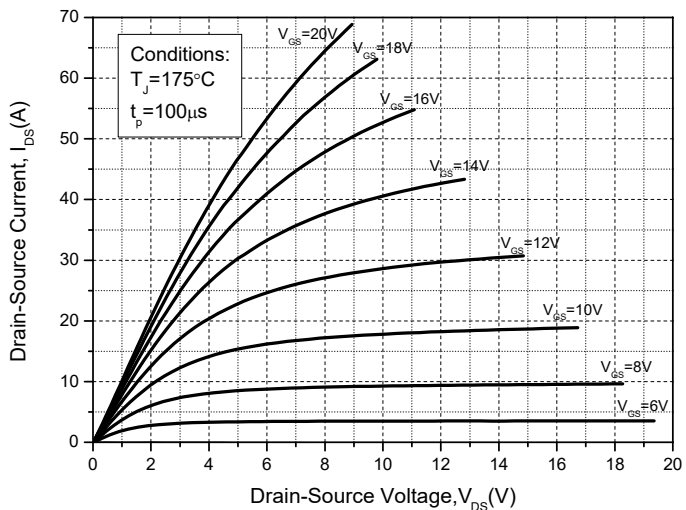


Figure 3. Output Characteristics  $T_J = 175^\circ\text{C}$

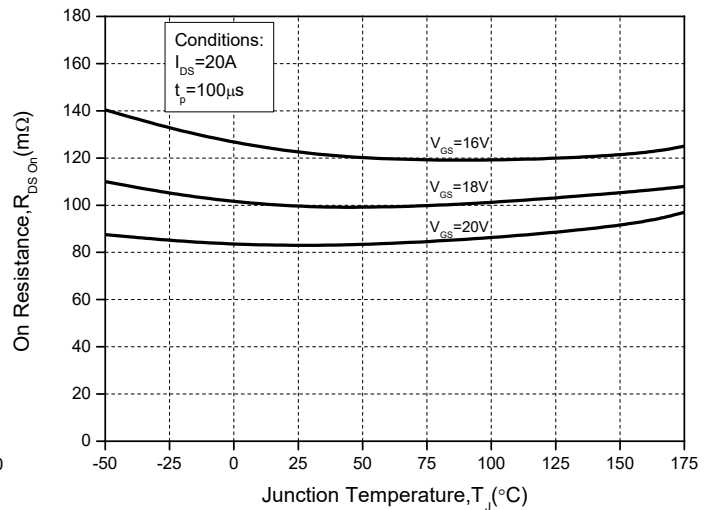


Figure 4. On-Resistance For Various Gate Voltage

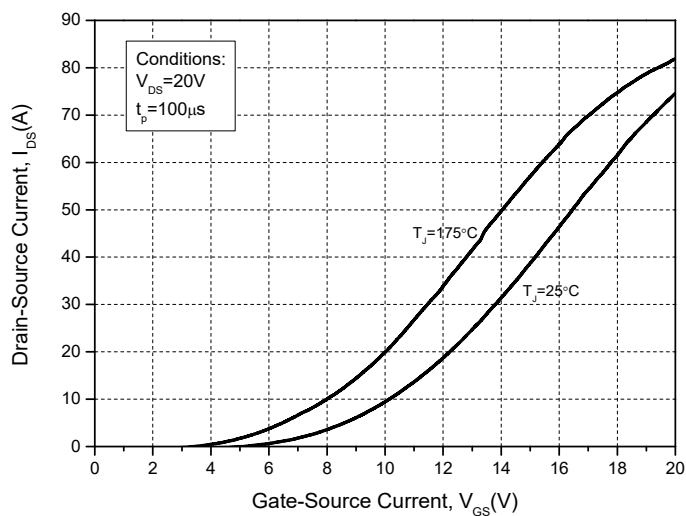


Figure 5. Transfer Characteristic for Various Junction Temperatures

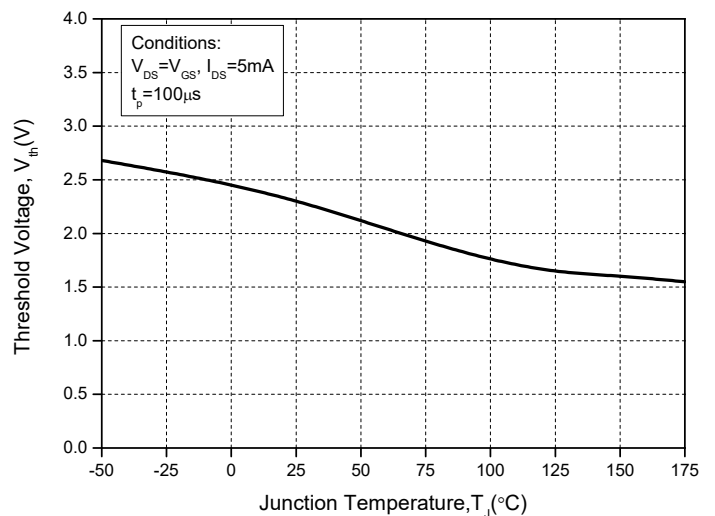


Figure 6. Threshold Voltage vs. Temperature

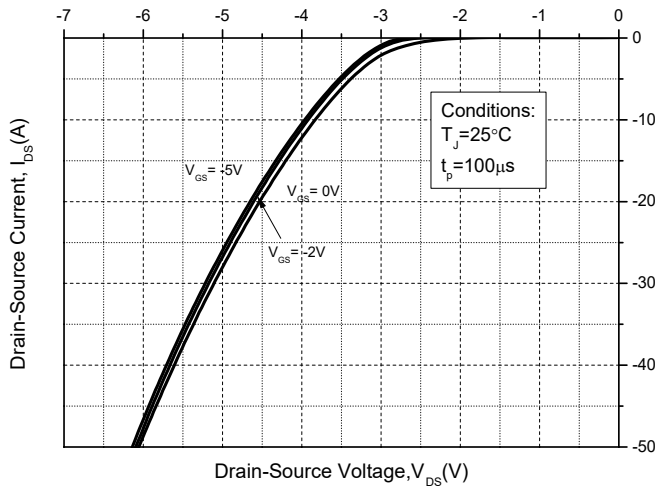


Figure 7. Body Diode Characteristics

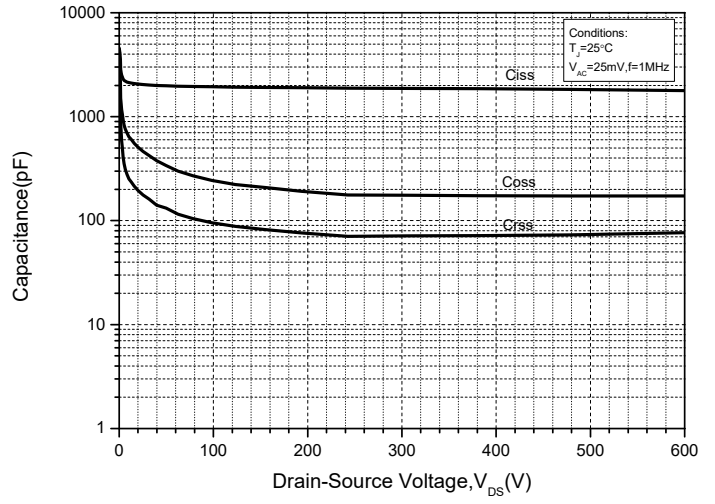


Figure 8. Capacitances vs. Drain-Source Voltage

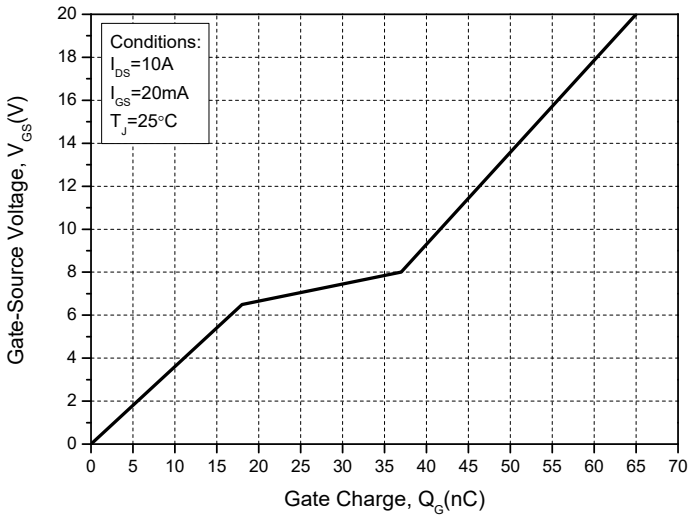


Figure 9. Gate Charge Characteristics

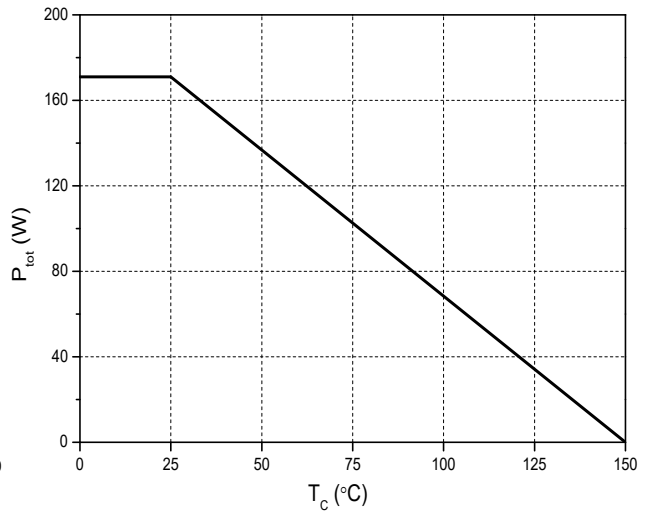


Figure 10. Power Dissipation Derating

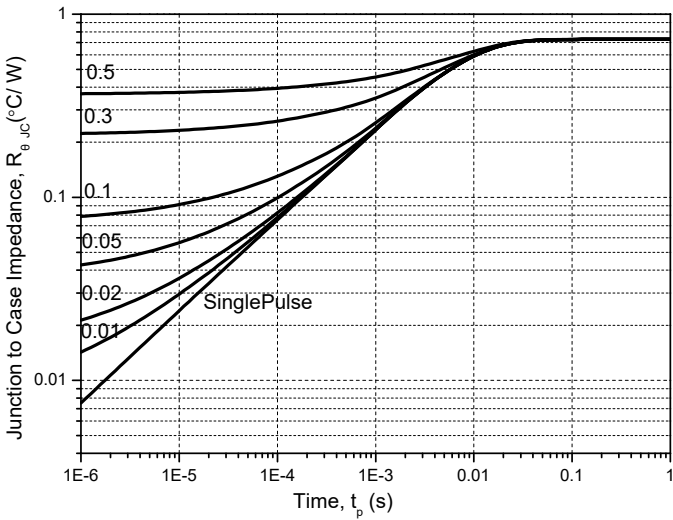
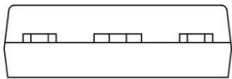
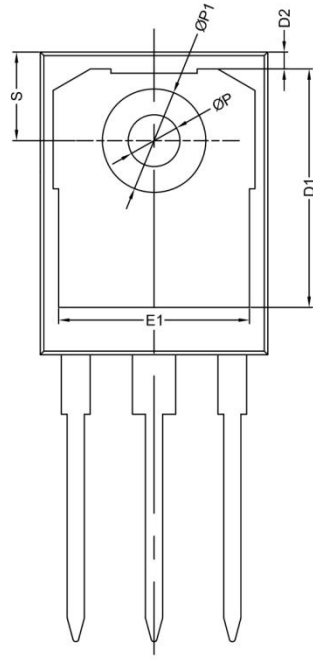
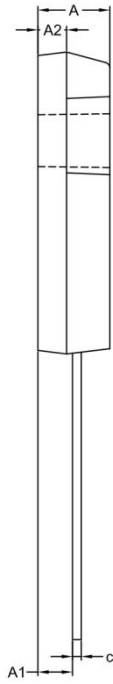
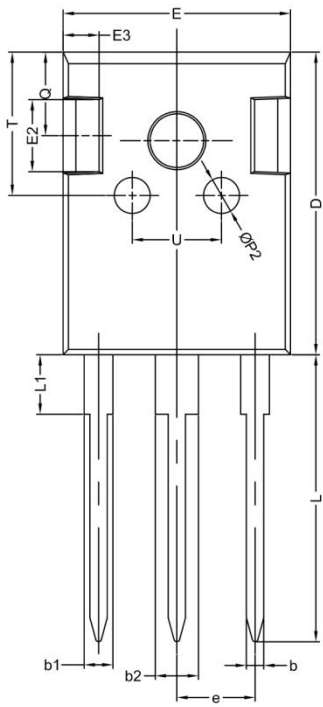


Figure 11. Transient Thermal Impedance

# Package Dimensions: TO-247-3L



符号	机械尺寸/mm		
	最小值	典型值	最大值
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.90	2.00	2.10
b	1.10	1.20	1.35
b1		2.00	
b2		3.00	
c	0.55	0.60	0.75
D	20.80	21.00	21.20
D1		16.55	
D2		1.20	
E	15.60	15.80	16.0
E1		13.30	
E2		5.00	
E3		2.50	
e		5.44	
L	19.42	19.92	20.42
L1		4.13	
P	3.50	3.60	3.70
P1	-	-	7.40
P2		2.50	
Q		5.80	
S	6.05	6.15	6.25
T		10.00	
U		6.20	