

SDM033N06D

60V N-Channel MOSFETs

Rev A.0

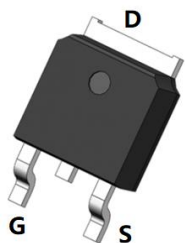
Feature

- ✧ Excellent $R_{DS(ON)}$
- ✧ Low Gate Charge
- ✧ Advanced trench technology
- ✧ Enhanced body diode performance.
- ✧ Green product (RoHS compliant), lead free
- ✧ 100% UIS Tested

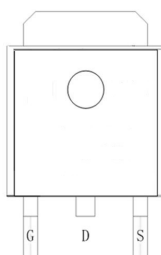
Product Summary

V_{DS}	60	V
$V_{GS(th)}_{Typ}$	1.6	V
$R_{DS(ON)}_{Typ}$ (at $V_{GS} = 10V$)	26	mΩ
I_D (at $V_{GS} = 10V$)	20	A

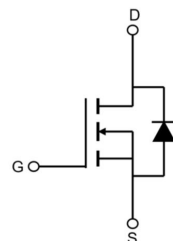
Type	Package	Marking	Outline	Media	Quantity (pcs)
SDM033N06D	TO-252	M033N06	Tape	13" Reel	2500



TO-252 top view



pin Assignment



Schematic Diagram

Absolute Maximum Ratings (Rating at $T_C = 25^\circ C$ unless otherwise noted)

Parameter		Symbol	Maximum	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ C$	I_D	20	A
	$T_C = 100^\circ C$		13	
Pulsed Drain Current ⁽¹⁾		I_{DM}	80	A
Avalanche Energy ⁽²⁾		E_{AS}	18	mJ
Power Dissipation	$T_C = 25^\circ C$	P_D	27.7	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +175	$^\circ C$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	1.0	1.6	2.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance ⁽³⁾	V _{GS} =10V, I _D =10A	-	26	33	mΩ
		V _{GS} =4.5V, I _D =5A	-	33	45	
V _{SD}	Diode Forward Voltage	I _S =20A, V _{GS} =0V	-	-	1.2	V
I _S	Maximum Body-Diode Continuous Current		-	-	20	A
I _{SM}	Maximum Body-Diode Pulsed Current		-	-	80	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz	-	1149	-	pF
C _{oss}	Output Capacitance		-	58.7	-	pF
C _{rss}	Reverse Transfer Capacitance		-	49.5	-	pF
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, I _D =10A	-	20.5	-	nC
Q _{gs}	Gate Source Charge		-	3.9	-	nC
Q _{gd}	Gate Drain Charge		-	5.5	-	nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =10V,V _{DS} =30V,ID=20A , R _{GEN} =1.8Ω	-	7.7	-	ns
t _r	Turn-On Rise Time		-	21	-	ns
t _{D(off)}	Turn-Off Delay Time		-	17	-	ns
t _f	Turn-Off Fall Time		-	25	-	ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=100A/μs	-	31	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=100A/μs	-	45	-	nC

Thermal Resistances

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal resistance from junction to case	-	5.4	°C /W

Notes:

- 1.Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
- 2.EAS condition : $T_J=25^{\circ}\text{C}$, $V_{DD}=30\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$, $I_{AS}=8.5\text{A}$.
- 3.Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$

Typical Electrical and Thermal Characteristics

Figure 1: Saturation Characteristics

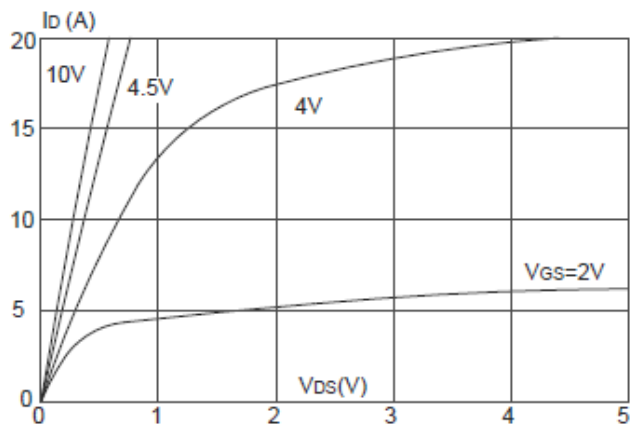


Figure 2: Transfer Characteristics

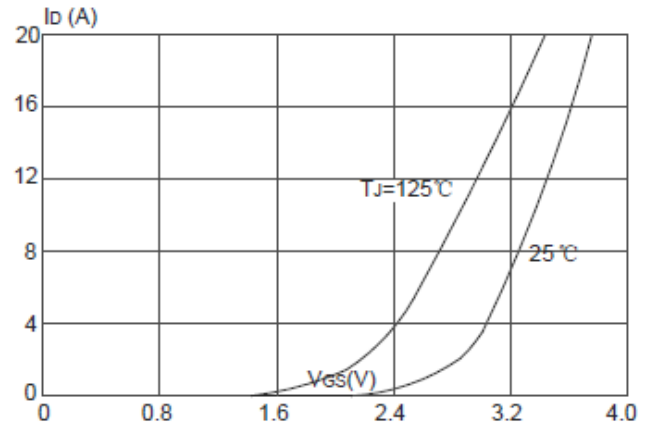
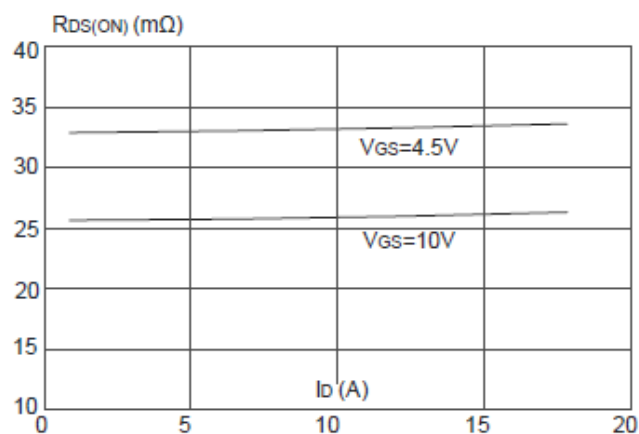
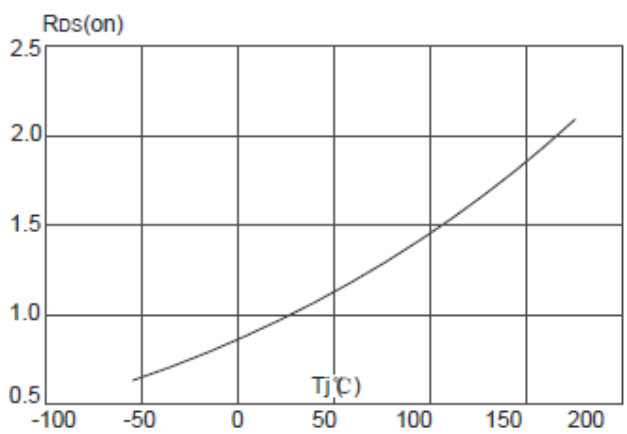
Figure 3: $R_{DS(ON)}$ vs. Drain CurrentFigure 4: $R_{DS(ON)}$ vs. Junction Temperature

Figure 5: Body-Diode Characteristics

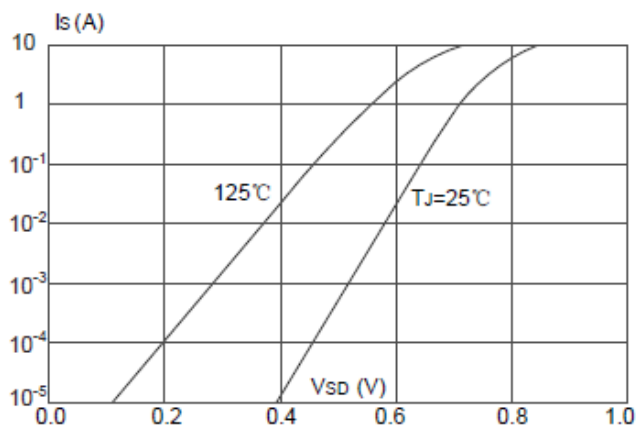
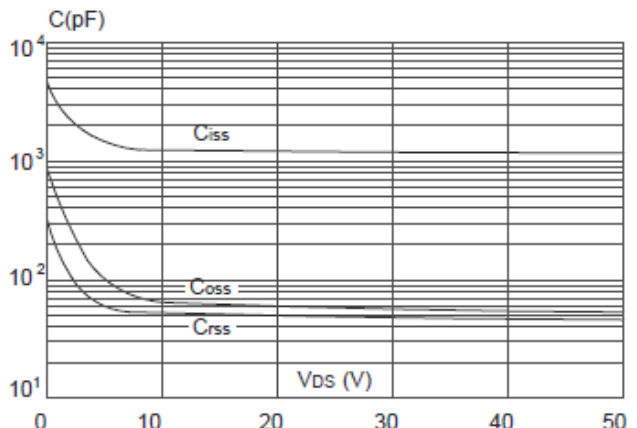


Figure 6: Capacitance characteristics



Typical Electrical and Thermal Characteristics

Figure 7: Current De-rating

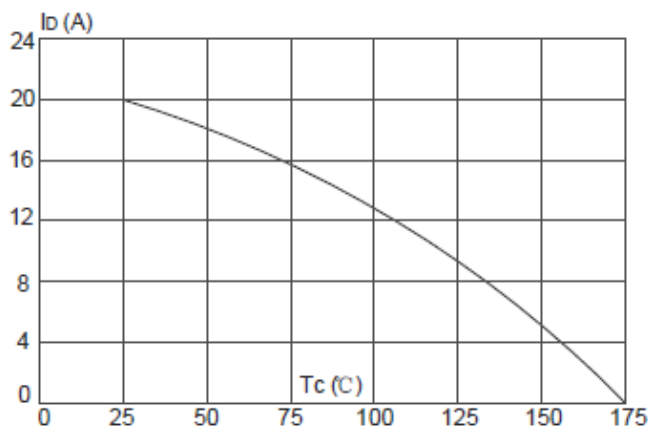


Figure 8: Gate Charge Characteristics

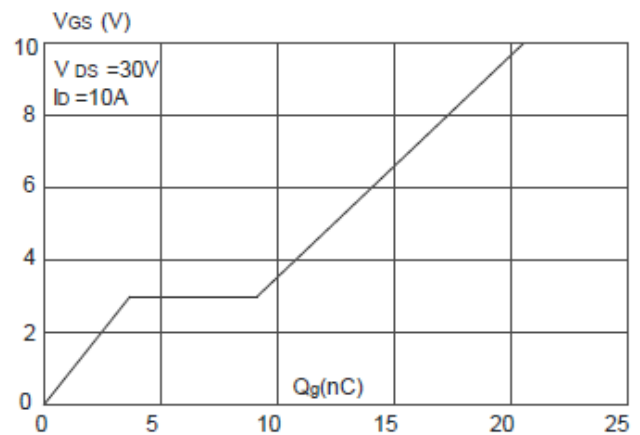


Figure 9: Maximum Safe Operating Area

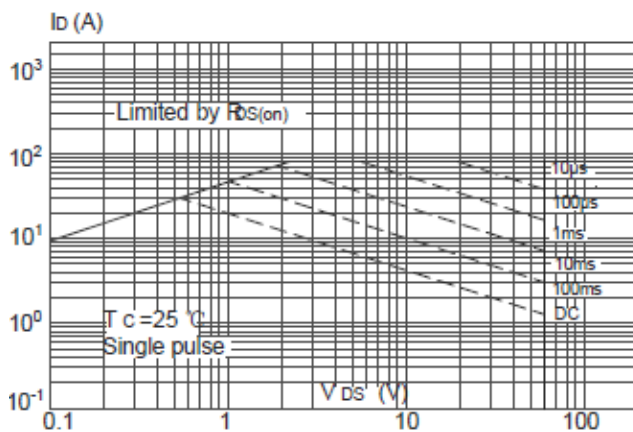


Figure 10: Normalized Breakdown Voltage vs. Junction Temperature

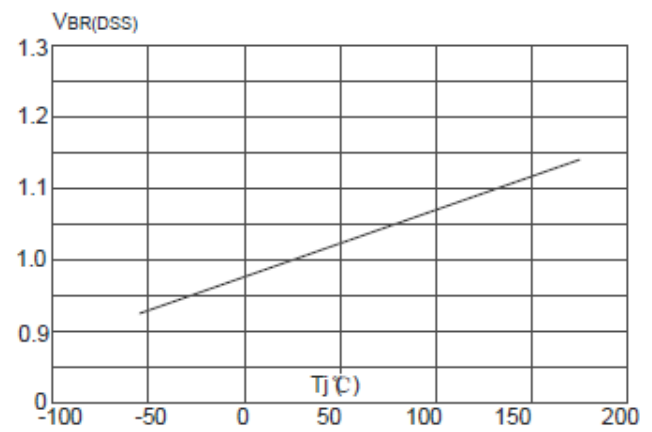
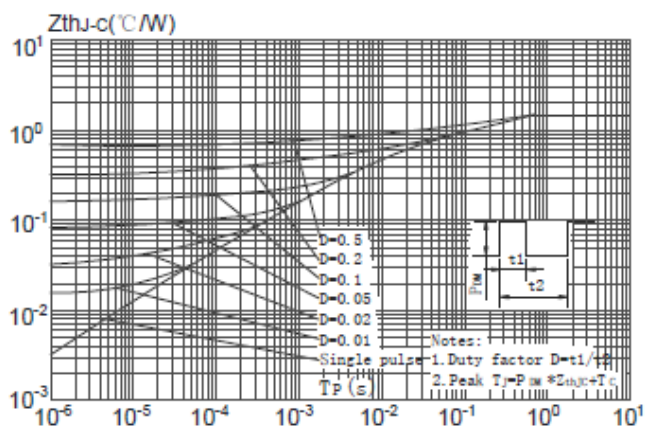


Figure 11: Normalized Maximum Transient Thermal Impedance



Test Circuit

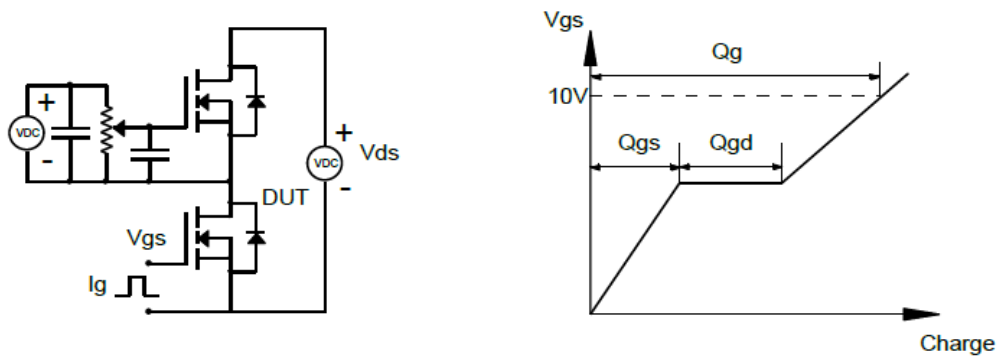


Figure1: Gate Charge Test Circuit & Waveforms

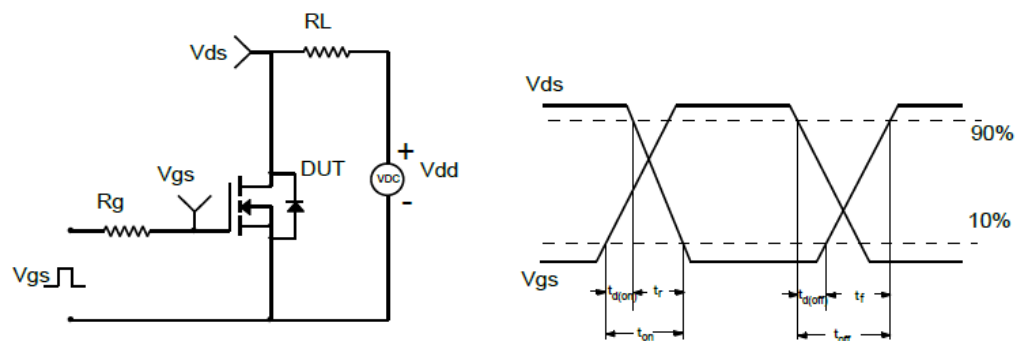


Figure2: Resistive Switching Test Circuit & Waveforms

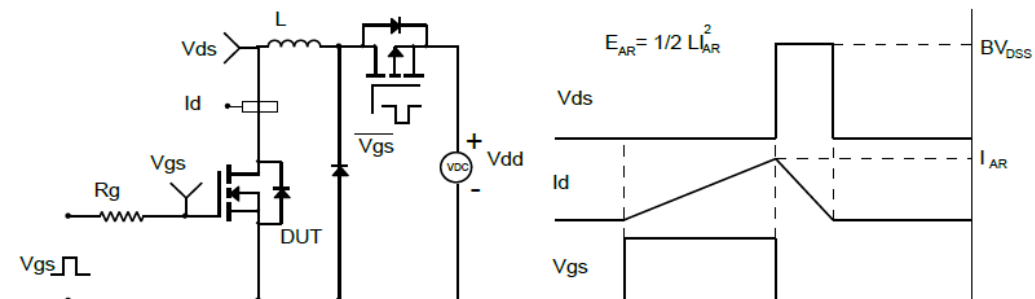


Figure3: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

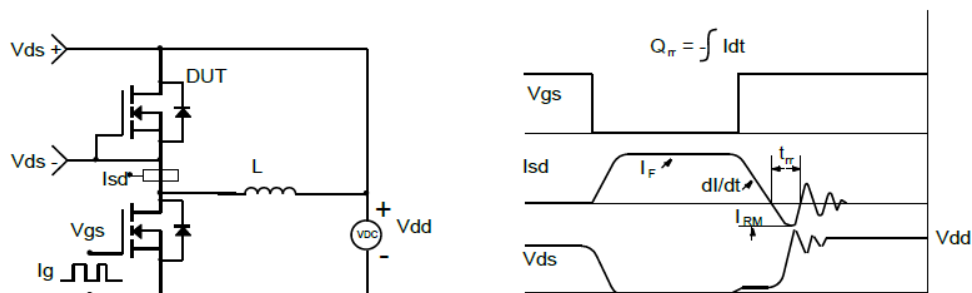
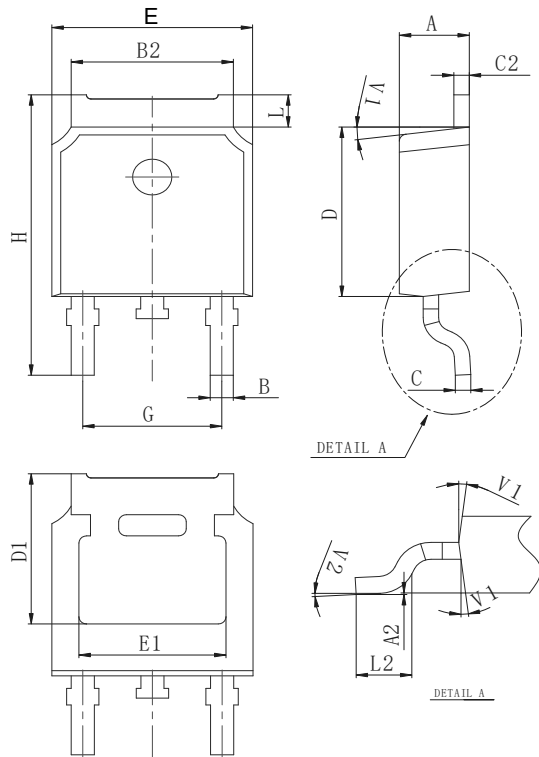


Figure4: Diode Recovery Test Circuit & Waveforms

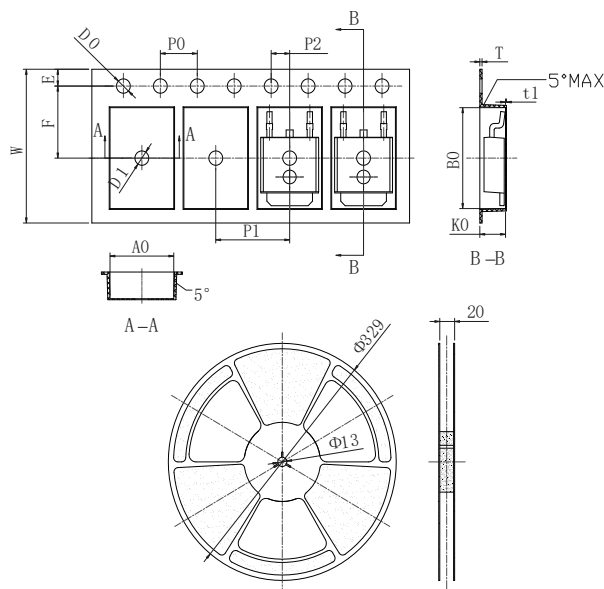
TO-252 Package Information

Package Mechanical



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Reel Specification



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583