



D1MNM047



100V N-Channel MOSFETs

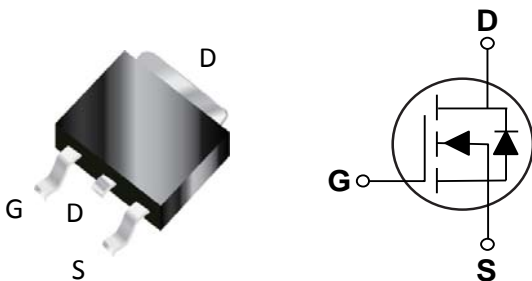
General Description

The D1MNM047 is the high cell density trenched N-ch MOSFETs, which provides excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The D1MNM047 meets the RoHS and Green Product requirement with full function reliability approved.

BV_{DSS}	$R_{DS(ON)}$	I_D
100 V	47 m Ω	22 A

TO-252 Pin Configuration



Features

- 100V, 22A, $R_{DS(ON)}=47m\Omega @V_{GS}=10V$
- Green Device Available
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology

Absolute Maximum Ratings $T_C=25^\circ C$ 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, $V_{GS} @ 10V$ (NOTE 1) ($T_C=25^\circ C$)	22	A
	Drain Current - Continuous, $V_{GS} @ 10V$ (NOTE 1) ($T_C=100^\circ C$)	13.5	A
	Drain Current - Continuous, $V_{GS} @ 10V$ (NOTE 1) ($T_A=25^\circ C$)	4.2	A
	Drain Current - Continuous, $V_{GS} @ 10V$ (NOTE 1) ($T_A=70^\circ C$)	3.4	A
I_{DM}	Drain Current - Pulsed (NOTE 2)	45	A
EAS	Single Pulse Avalanche Energy (NOTE 3)	36.5	mJ
I_{AS}	Avalanche Current	27	A
P_D	Total Power Dissipation (NOTE 4) ($T_C=25^\circ C$)	52.1	W
	Total Power Dissipation (NOTE 4) ($T_A=25^\circ C$)	2	W
T_J	Operating Junction Temperature Range	-50 to 150	$^\circ C$
T_{STG}	Storage Temperature Range	-50 to 150	$^\circ C$
Marking Code		D0016 , NM047	

Thermal Characteristics

Symbol	Parameter	Typ.	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (NOTE 1)	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case (NOTE 1)	---	2.4	$^\circ C/W$

**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	100	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =80V, V _{GS} =0V, T _J =25°C	---	---	10	uA
		V _{DS} =80V, V _{GS} =0V, T _J =55°C	---	---	100	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 =20A	---	38	47	mΩ
		V _{GS} =4.5V, I _D =15A	---	40	50	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.3	---	2.5	V
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =20A	---	28.7	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q _g	Total Gate Charge	V _{DS} =80V, V _{GS} =10V, I _D =20A	---	60	84	nC
Q _{gs}	Gate-Source Charge		---	9.7	14	
Q _{gd}	Gate-Drain Charge		---	11.8	16.5	
T _{d(on)}	Turn-On Delay Time	V _{DD} =50V, V _{GS} =10V, R _G =3.3Ω, I _D =20A	---	10.4	21	ns
T _r	Rise Time		---	46	83	
T _{d(off)}	Turn-Off Delay Time		---	54	108	
T _f	Fall Time		---	10	20	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	3848	5387	pF
C _{oss}	Output Capacitance		---	137	192	
C _{rss}	Reverse Transfer Capacitance		---	82	115	
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	1.6	3.2	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current (NOTE 1、5)	V _G =V _D =0V, Force Current	---	---	22	A
I _{SM}	Pulsed Source Current (NOTE 2、5)		---	---	45	A
V _{SD}	Diode Forward Voltage (NOTE 2)	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =20A, di/dt=100A/μs,	---	30	---	ns
Q _{rr}	Reverse Recovery Charge	T _J =25°C	---	37	---	nC

NOTES :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2oz copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=27A
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.



Characteristics Curves

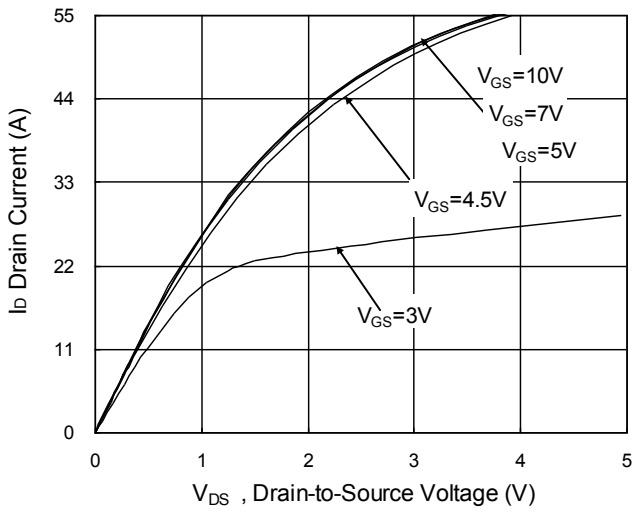


Fig.1 Typical Output Characteristics

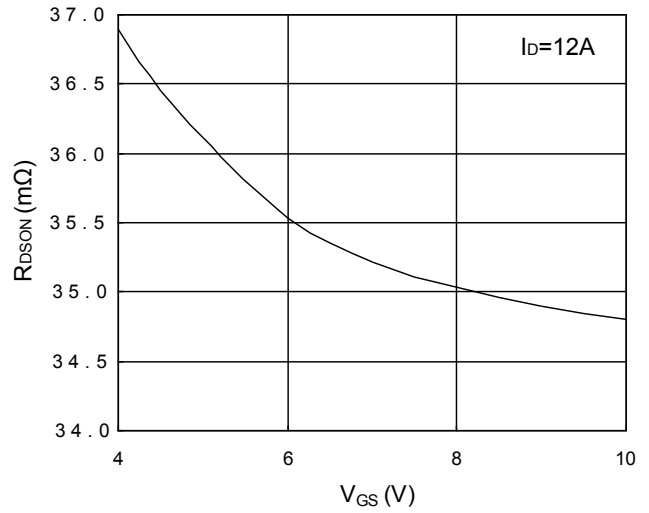


Fig.2 On-Resistance vs. Gate-Source

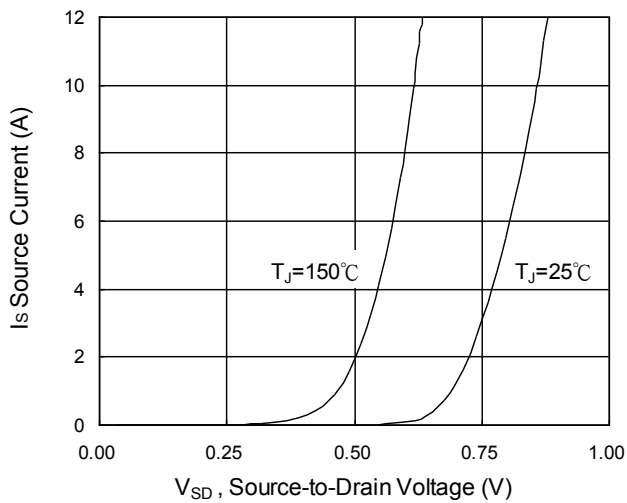


Fig.3 Forward Characteristics Of Reverse

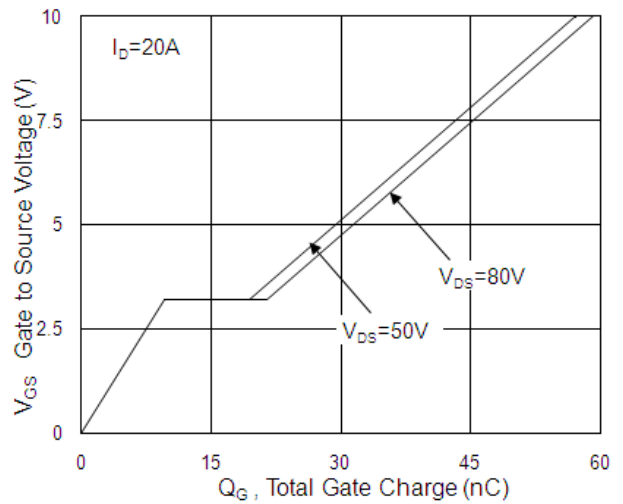


Fig.4 Gate-Charge Characteristics

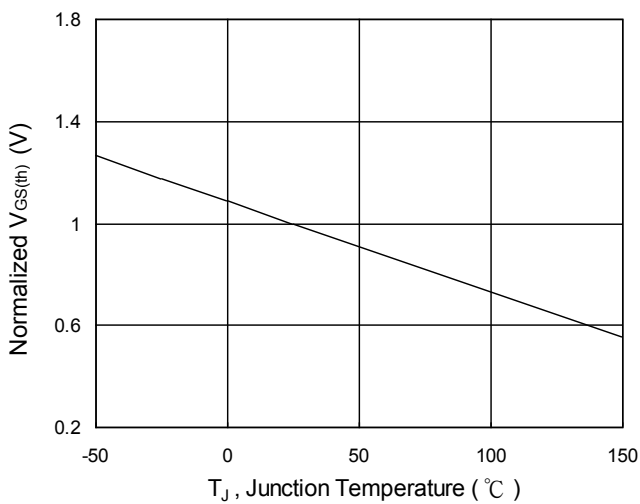


Fig.5 Normalized V_{GS(th)} vs. T_J

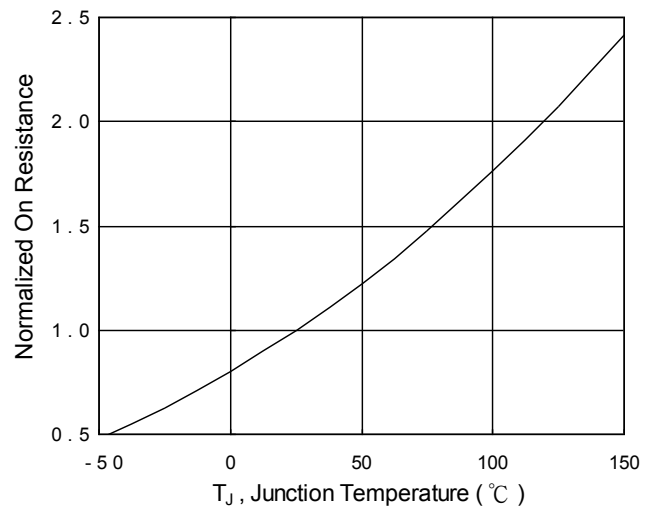


Fig.6 Normalized R_{DSON} vs. T_J



Characteristics Curves

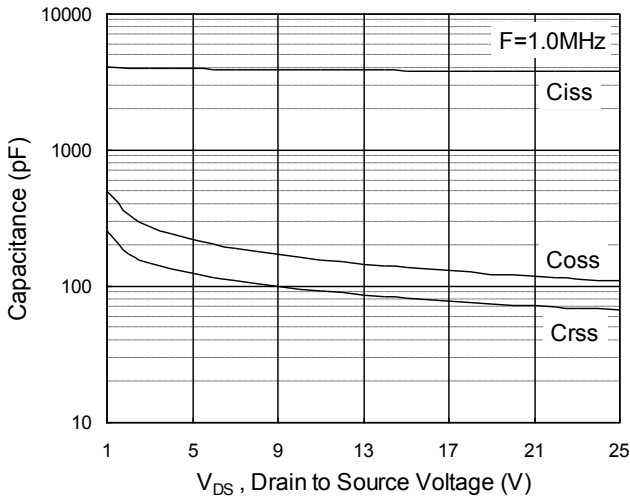


Fig.7 Capacitance

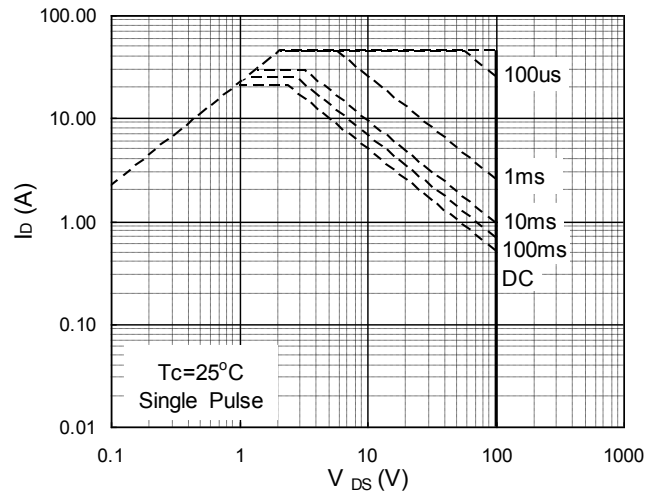


Fig.8 Safe Operating Area

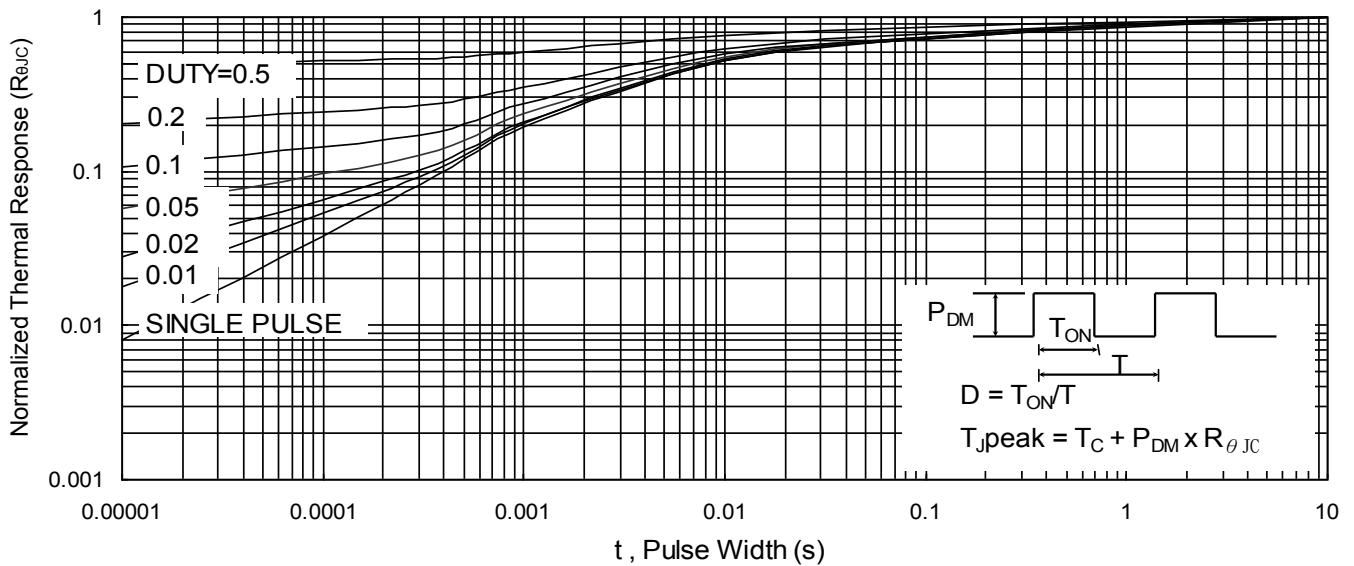


Fig.9 Normalized Maximum Transient Thermal Impedance

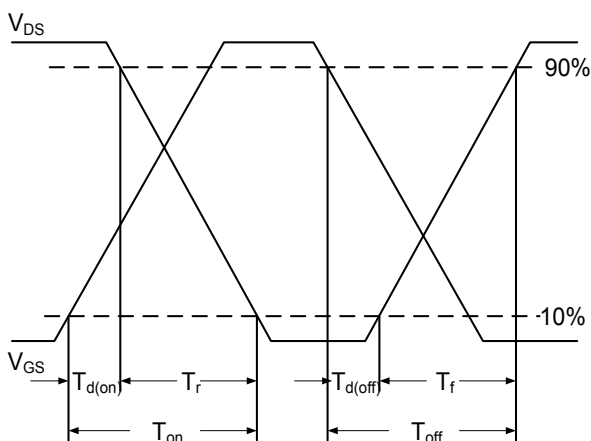


Fig.10 Switching Time Waveform

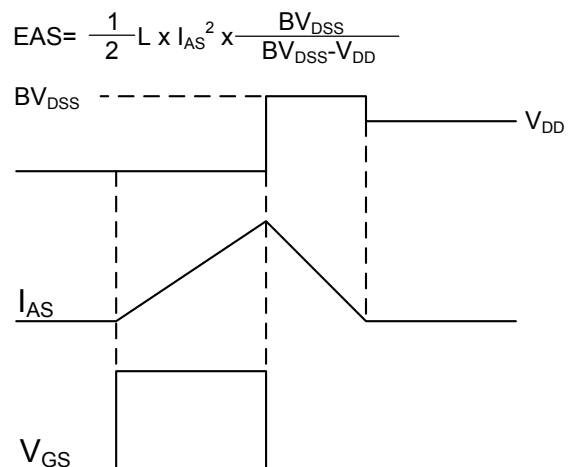
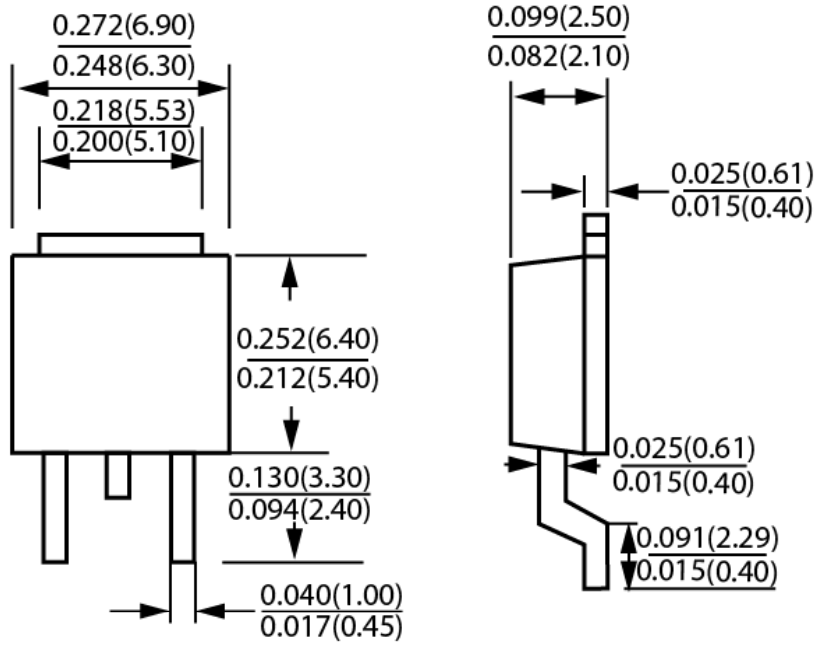


Fig.11 Unclamped Inductive Switching Waveform



Package Outline Dimensions



TO-252

Dimensions in inches and (millimeters)



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