

031N03T-D5

30V N-Channel Super Trench Power MOSFET



Description

031N03T-D5 is uses Super Trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications

General Features

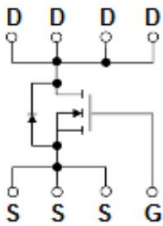
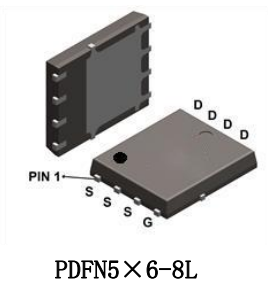
- Advanced shielded-gate technology
- Ultra-low on-resistance and gate-charge
- RoHS compliant

MAIN CHARACTERISTICS

ID	107A
VDSS	30v
R _{DS(ON)Typ} (at VGS=10V)	2.3mΩ

Application

- High-frequency DC-to-DC convertors
- Motor controllers
- Battery management and protection
- Server power



Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
031N03T	031N03T-D5	PDFN3×3-8L	5000 pcs/Tape & Reel

Absolute maximum ratings

Symbol	Parameter		Limit	Unit
V _{DSS}	Drain-source voltage		30	V
V _{GSS}	Gate-Source Voltage		±20	V
I _D	Drain Current -continuous(TC=25℃) (1)		107	A
	Drain Current -continuous(TC=100℃) (1)		68	
I _{DM}	Drain Current-Pulsed (2)		428	A
P _D	Power Dissipation	T _c =25℃	56	W
E _{AS}	Single pulsed avalanche energy (3)		83.5	mJ
T _J , T _{STG}	Operating and Storage Temperature Range		-50~150	℃

Thermal Characteristics

Symbol	Parameter	Value	Units
R _{θJC}	Thermal Resistance, Juction-to-Case	2.2	℃/W
R _{θJA}	Thermal Resistance, Juction-to-Ambient (4)	55	℃/W

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Electrical Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max	Unit
Static Characteristics						
BV_{DS}	Drain Source breakdown voltage	$V_{GS}=0V, I_D=250\mu A, T_J=25^{\circ}\text{C}$	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
I_{GSS}	Gate-to-Source Forward Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1,1	-	2.2	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=20A$	-	2.3	3.1	$m\Omega$
		$V_{GS}=4.5V, I_D=20A$	-	3.3	4.6	$m\Omega$
R_G	Gate Resistance	$f = 1 \text{ MHz}$	-	2.7	-	Ω

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1MHz$	-	2200	-	pF
C_{oss}	Output Capacitance		-	1100	-	pF
C_{rss}	Reverse Transfer Capacitance		-	70	-	pF

SWITCHING Characteristics

$T_{D(on)}$	Turn-on Delay Time	$V_{DD} = 15V$ $V_{GS} = 10V$ $R_G = 3\Omega$ $I_D = 20A$	-	14	-	ns
T_r	Turn-on Rise Time		-	6	-	ns
$T_{D(off)}$	Turn-off Delay Time		-	28	-	ns
T_f	Turn-off Fall Time		-	14	-	ns
Q_g	Total Gate Charge	$V_{DD} = 15V$ $V_{GS} = 10V$ $I_D = 20A$	-	32	-	nC
Q_{gs}	Gate Source Charge		-	5	-	nC
Q_{gd}	Gate Drain Charge		-	6	-	nC

Drain-Source Diode Characteristics and Maximum Ratings

V_{SD}	Drain-Source Diode Forward Voltage	$I_S = 20A, V_{GS} = 0V$	-	-	1.2	V
T_{rr}	Reverse Recovery Time	$I_S = 20A, V_{GS} = 0V$ $di/dt = 100A/\mu s$	-	27	-	ns
Q_{rr}	Reverse Recovery Charge		-	34	-	nC

Notes:

1. Rated according to $R_{\theta JC}$
2. Limited by maximum T_J
3. Starting $T_J = 25^{\circ}\text{C}$, $I_{AS} = 26A$, $L = 0.1mH$
4. Surface-mounted on 1 inch² FR4 board, 2 oz Cu

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

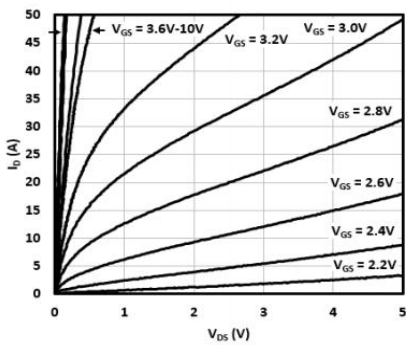


Fig. 1 Output characteristics

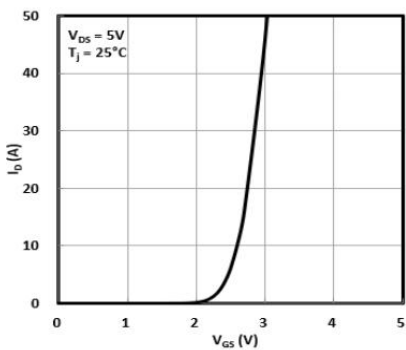


Fig. 2 Transfer characteristics

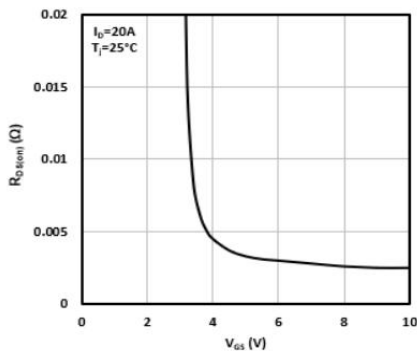


Fig.3 On-resistance vs. gate voltage

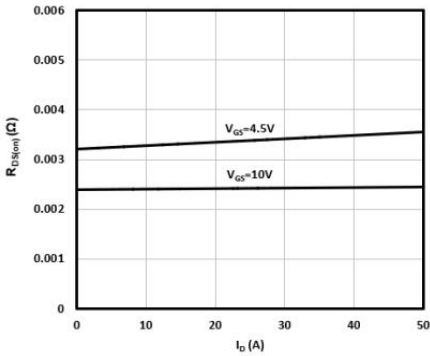


Fig.4 On-resistance vs. drain current

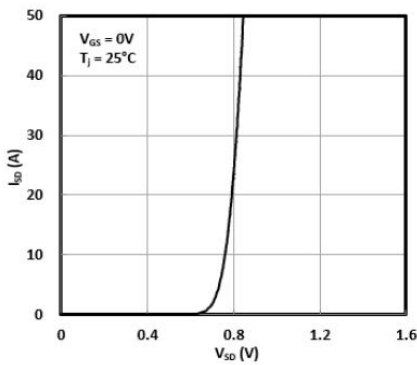


Fig.5 Source-to-drain diode forward characteristics

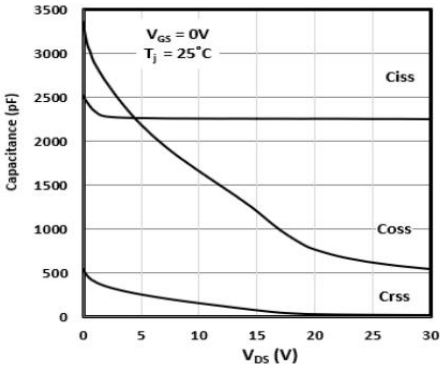


Fig.6 Capacitance vs. drain-to-source voltage

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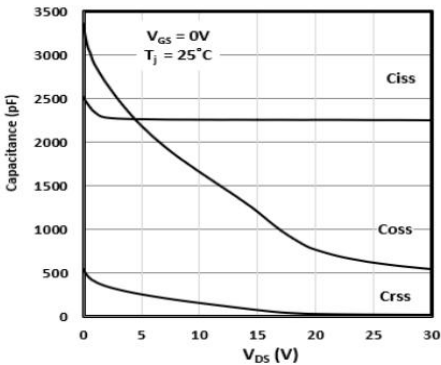


Fig.6 Capacitance vs. drain-to-source voltage

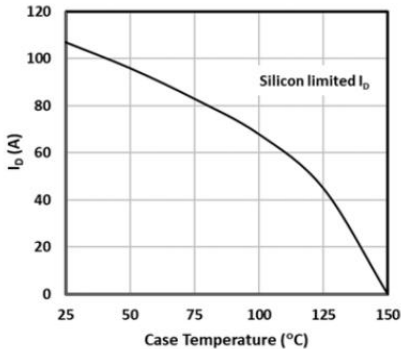
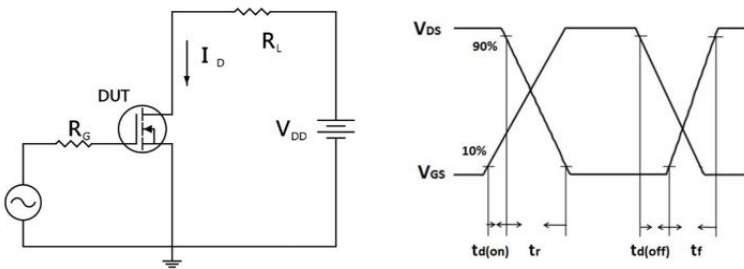
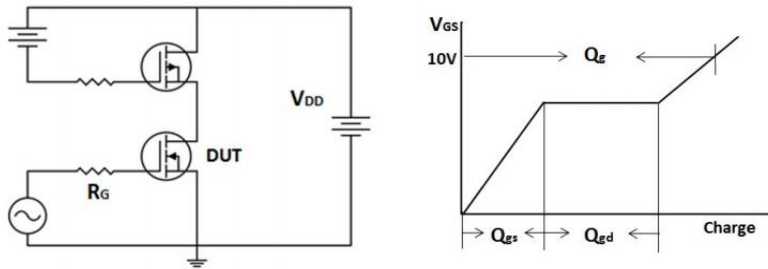


Fig.8 Maximum drain current vs. case temperature

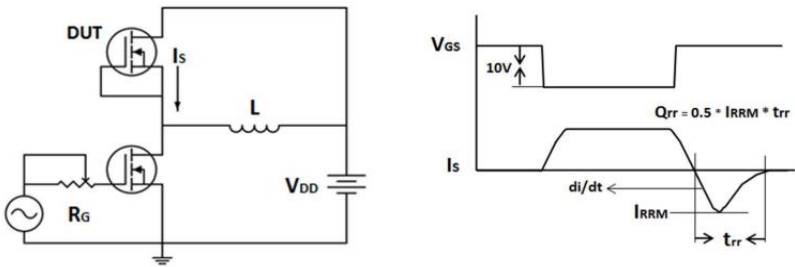
Test Circuits and Waveforms



Resistive switching time test circuit & waveforms

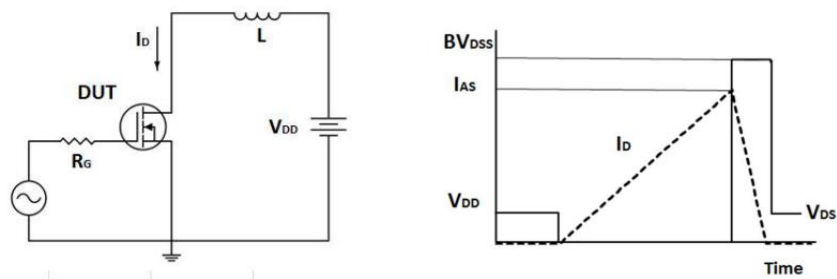


Gate charge test circuit & waveform



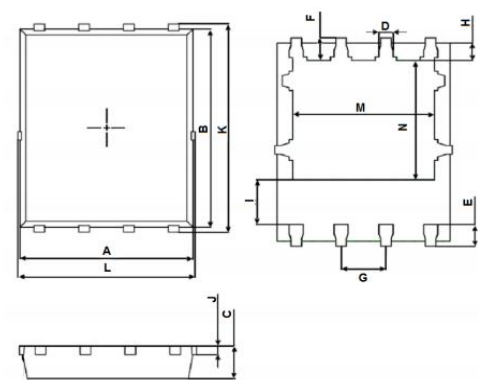
Peak diode recovery dv/dt test circuit & waveforms

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Unclamped inductive switching test circuit & waveforms

PDFN5*6-8L Package Information



PDFN5×6-8L		
Dimension	Min.	Max.
A	4.824	4.976
B	5.674	5.826
C	0.900	1.000
D	0.350	0.450
E	0.559	0.711
F	0.574	0.726
G	1.250	1.290
H	0.424	0.576
I	1.190	1.390
J	0.154	0.354
K	5.974	6.126
L	4.944	5.096
M	3.910	4.110
N	3.375	3.575

