050N03T-D3

30V N-Channel Super Trench Power MOSFET

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Description

050N03T-D3 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

MAIN CHARACTERISTICS

ID	**30A**
VDSS	**30v**
$R_{DS(ON)Typ}$ (at VGS=10V)	**4.1mΩ**

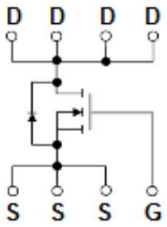
General Features

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

Application

- DC/DC Converter
- Motor controllers
- Battery-driven electronic products, electrical equipment and machines

PDFN3×3-8L



Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
050N03T	050N03T-D3	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)(2)		30	A
	Drain Current -continuous(TC=100℃) (1)(2)		10	
I_{DM}	Drain Current-Pulsed (5)		120	A
P_D	Power Dissipation	Tc=25℃	37	W
E_{AS}	Single pulsed avalanche energy (6)		29	mJ
T_J, T_{STG}	Operating and Storage Temperature Range		–50~150	℃

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Juction-to-Case	3.4	℃/W
$R_{\theta JA}$	Thermal Resistance, Juction-to-Ambient (4)	62	℃/W

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Electrical Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max	Unit
Static Characteristics						
BV_{DSS}	Drain Source breakdown voltage	V_{GS}=0V,I_D=250uA,T_J=25℃	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V,V_{GS}=0V	-	-	1	uA
I_{GSS}	Gate-to-Source Forward Leakage	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	1	-	2	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A	-	4.1	5.0	mΩ
		V_{GS}=4.5V, I_D=20A	-	6.5	8	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	V_{GS} = 0V V_{DS} = 15V f =1MHz	-	960	-	pF
Coss	Output Capacitance		-	410	-	pF
Crss	Reverse Transfer Capacitance		-	60	-	pF
SWITCHING Characteristics						
$T_{D(on)}$	Turn-on Delay Time	V_{DD} = 15V V_{GS} = 10V R_G = 3Ω I_D = 15A	-	7	-	ns
T_r	Turn-on Rise Time		-	2.8	-	ns
$T_{D(off)}$	Turn-off Delay Time		-	21.4	-	ns
T_f	Turn-off Fall Time		-	5.3	-	ns
Q_g	Total Gate Charge	V_{DD} = 15V V_{GS} = 10V I_D = 20A	-	17.4	-	nC
Q_{gs}	Gate Source Charge		-	3.4	-	nC
Q_{gd}	Gate Drain Charge		-	3.1	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
V_{SD}	Drain-Source Diode Forward Voltage	I_S = 10A, VGS = 0V	-	-	1.2	V
T_{rr}	Reverse Recovery Time	I_S = 20A, VGS = 0V di/dt = 100A/μs	-	12.3	-	ns
Q_{rr}	Reverse Recovery Charge		-	17.6	-	nC

Notes:

1. Limited by package.

2. Rated according to $R_{\theta JC}$

3. Rated according to $R_{\theta JA}$

4. Surface-mounted on 1 inch² FR4 board, 2 oz Cu

5. Limited by maximum T_J

6. Starting TJ = 25° C, IAS = 17A, L = 0.1mH, VDD = 20V, VGS = 10V

7. Pulse width limited by maximum TJ

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

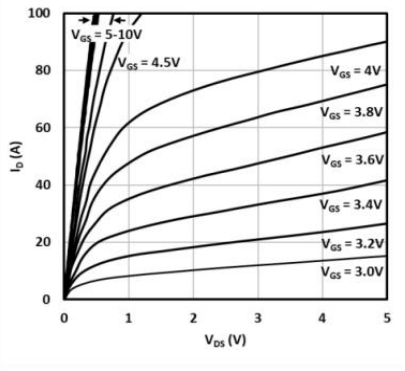


Fig. 1 Output characteristics

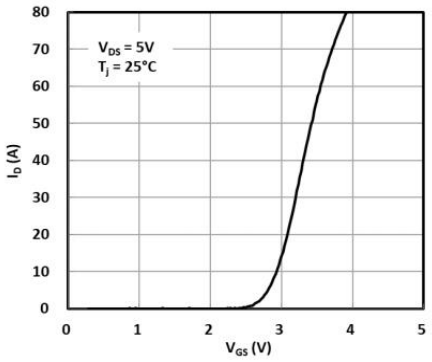


Fig. 2 Transfer characteristics

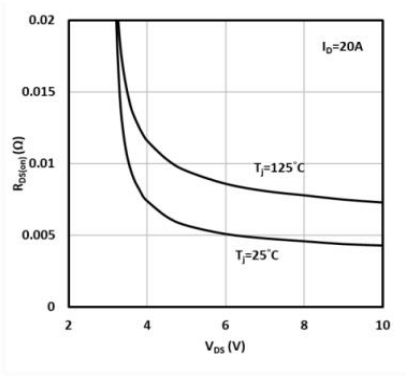


Fig.3 On-resistance vs. gate voltage

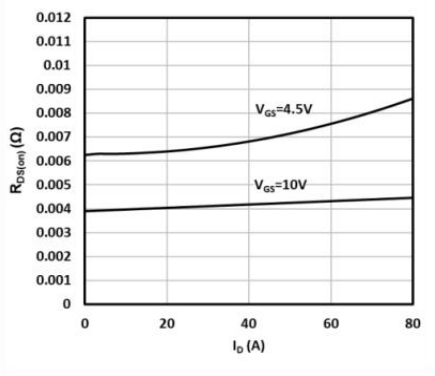


Fig.4 On-resistance vs. drain current

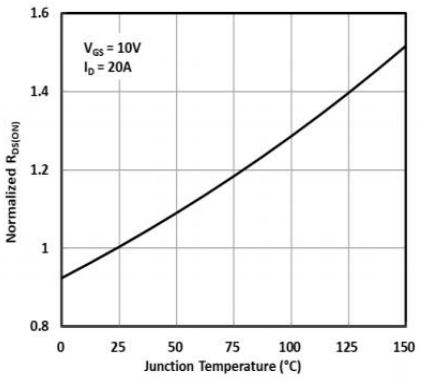


Fig.5 Normalized on-resistance vs. temperature

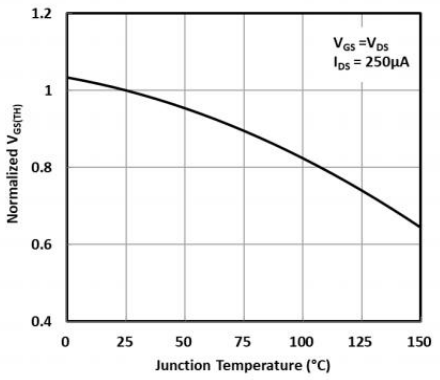


Fig.6 Normalized gate threshold voltage vs. temperature

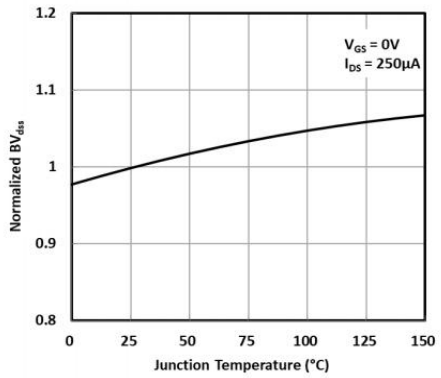


Fig.7 Normalized drain-to-source breakdown voltage vs. temperature

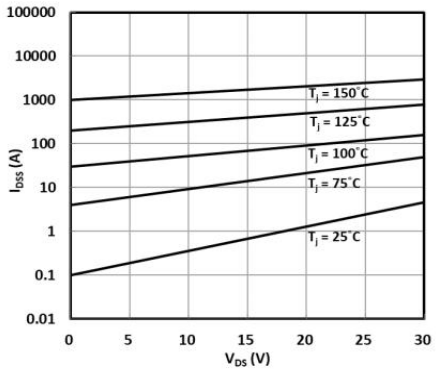


Fig.8 Drain-to-source leakage current vs. voltage

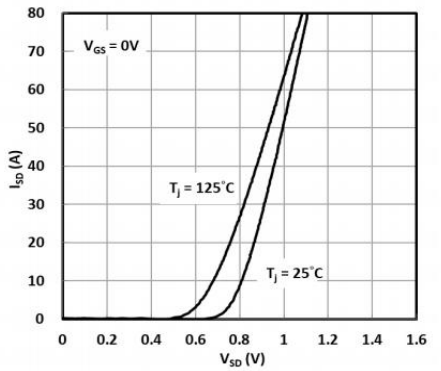


Fig.9 Source-to-drain diode forward characteristics

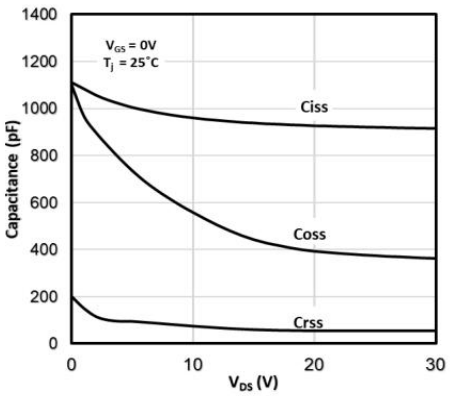


Fig.10 Capacitance vs. drain-to-source voltage

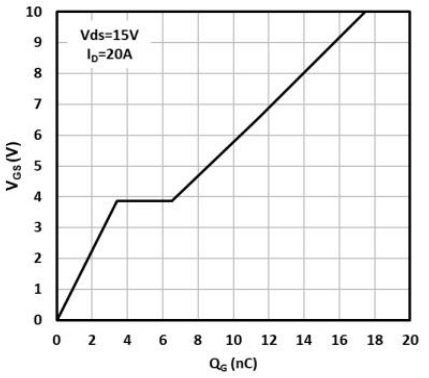


Fig.11 Gate-to-source voltage vs. gate charge

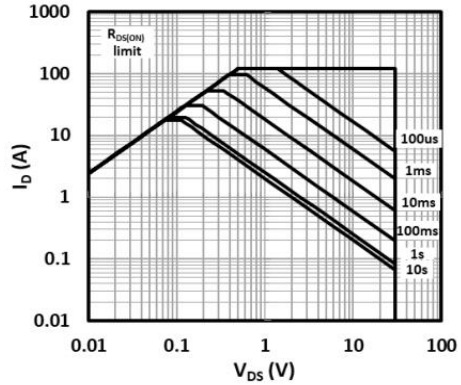


Fig. 12 Safe operating area

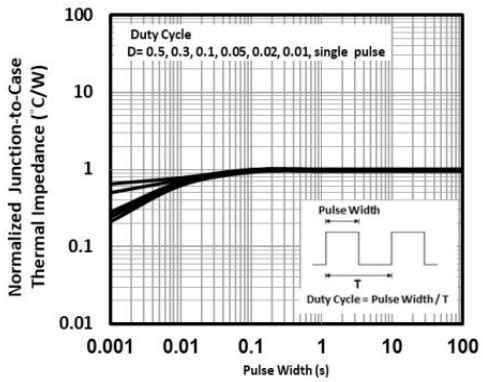


Fig. 13 Junction-to-case thermal impedance

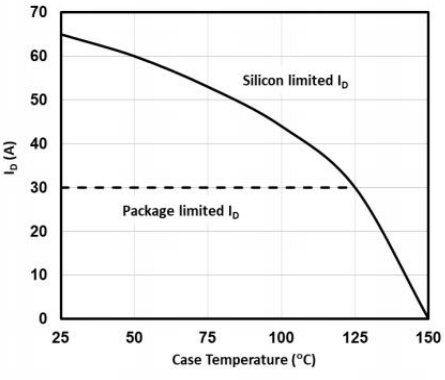


Fig.14 Maximum drain current vs. case temperature

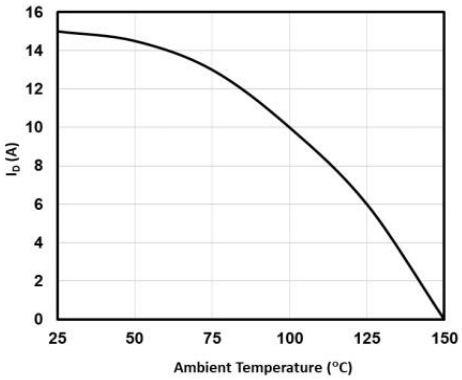
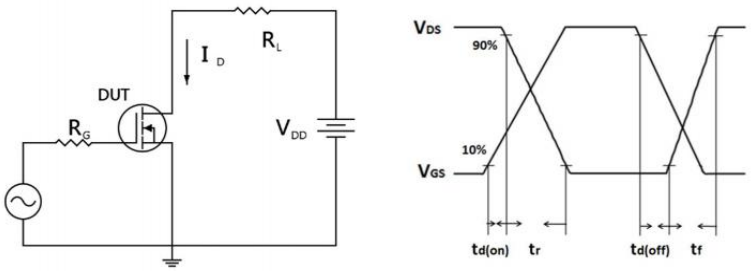
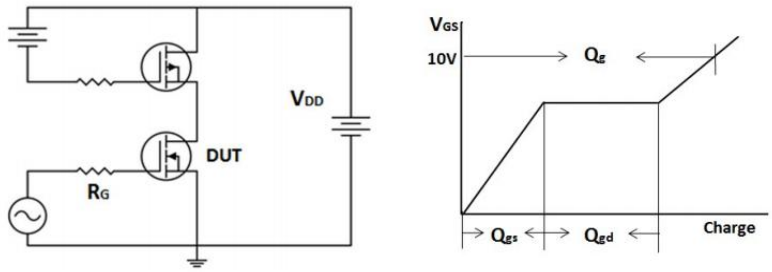


Fig.15 Maximum drain current vs. ambient temperature

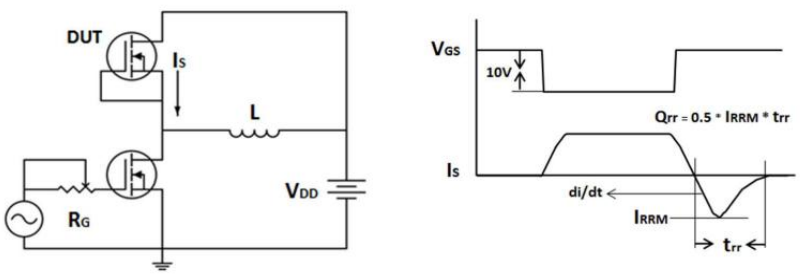
Test Circuits and Waveforms



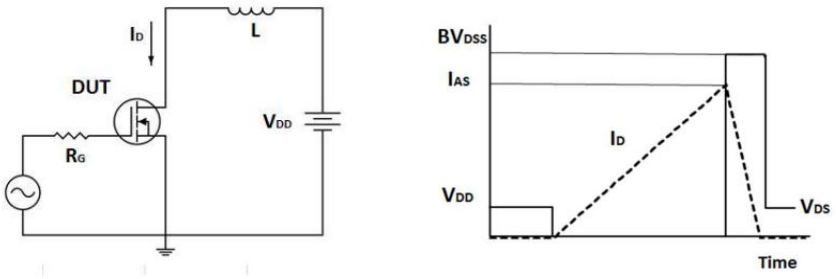
Resistive switching time test circuit & waveforms



Gate charge test circuit & waveform

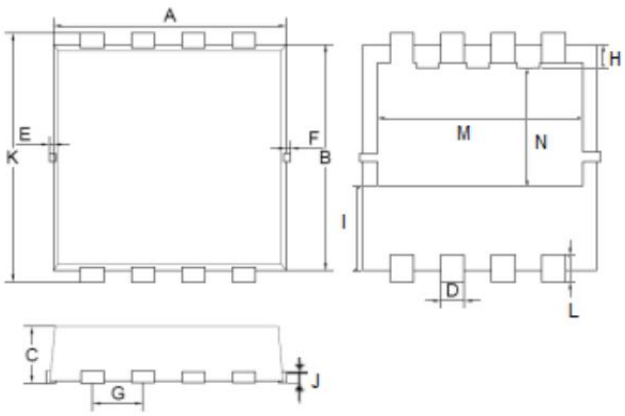


Peak diode recovery dv/dt test circuit & waveforms



Unclamped inductive switching test circuit & waveforms

PDFN3*3-8L Package Information



PDFN3×3-8L		
Dimension	**Min.**	**Max.**
A	2.90	3.10
B	2.90	3.10
C	0.65	0.85
D	0.20	0.40
E	0.00	0.10
F	0.00	0.10
G	0.55	0.75
H	0.20	0.40
I	0.70	1.10
J	0.10	0.20
K	3.15	3.45
L	0.20	0.40
M	2.35	2.55
N	1.500	1.900