

SISS27DN-T1-GE3

30V P-Channel MOSFET

General Description

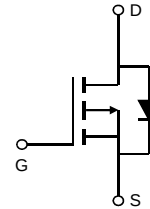
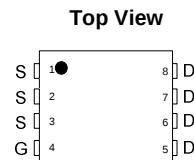
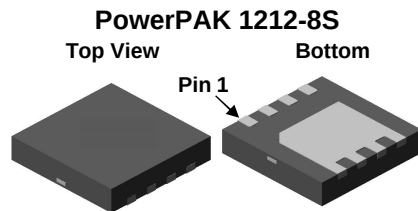
The SISS27DN uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This device is ideal for load switch and battery protection applications.

- RoHS and Halogen-Free Compliant

Product Summary

V_{DS}	-30V
I_D (at $V_{GS} = -10V$)	-50A
$R_{DS(ON)}$ (at $V_{GS} = -10V$)	< 6.2m Ω
$R_{DS(ON)}$ (at $V_{GS} = -6V$)	< 8.9m Ω

100% UIS Tested
100% R_g Tested



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^G	I_D	-50	A
		-39	A
Pulsed Drain Current ^C	I_{DM}	-210	A
Continuous Drain Current	I_{DSM}	-25	A
		-20	A
Avalanche Current ^C	I_{AR}, I_{AS}	-44	A
Repetitive avalanche energy $L=0.1\text{mH}$ ^C	E_{AR}, E_{AS}	97	mJ
Power Dissipation ^B	P_D	83	W
		33	W
Power Dissipation ^A	P_{DSM}	6.25	W
		4	W
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	16	20	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A,D}		45	55	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	1.1	1.5	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-30\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 25\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1.7	-2.2	-2.8	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}$, $V_{DS}=-5\text{V}$	-210			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}$, $I_D=-20\text{A}$ $T_J=125^\circ\text{C}$		5.1 7.6	6.2 9.2	$\text{m}\Omega$
		$V_{GS}=-6\text{V}$, $I_D=-20\text{A}$		7.1	8.9	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}$, $I_D=-10\text{A}$		10.7		$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-20\text{A}$		46		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.7	-1	V
I_S	Maximum Body-Diode Continuous Current ⁶				-50	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$	1960	2450	2940	pF
C_{oss}	Output Capacitance		380	550	720	pF
C_{rss}	Reverse Transfer Capacitance		220	370	520	pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	7	14	28	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $I_D=-20\text{A}$	33	42	51	nC
$Q_g(4.5\text{V})$	Total Gate Charge		16	21	26	nC
Q_{gs}	Gate Source Charge		5.5	7	8.5	nC
Q_{gd}	Gate Drain Charge		7	12	17	nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $R_L=0.75\Omega$, $R_{GEN}=3\Omega$		9.5		ns
t_r	Turn-On Rise Time			10		ns
$t_{D(off)}$	Turn-Off DelayTime			104		ns
t_f	Turn-Off Fall Time			78		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-20\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$	20	25	30	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-20\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$	37	47	57	nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$, $t \leq 10\text{s}$ value and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using $<300\mu\text{s}$ pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=150^\circ\text{C}$. The SOA curve provides a single pulse rating.

G. The maximum current rating is limited by package.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

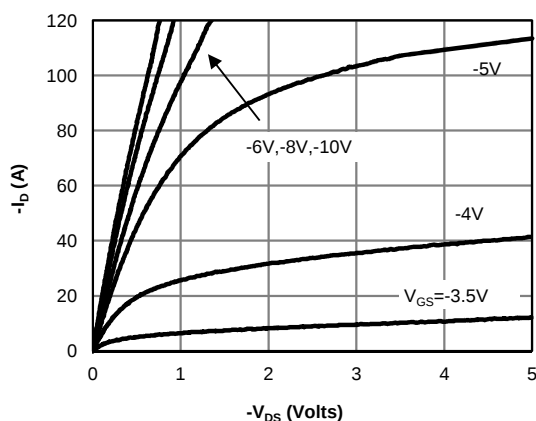


Fig 1: On-Region Characteristics (Note E)

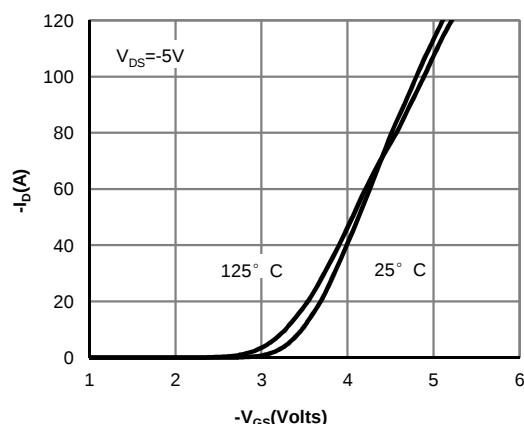


Figure 2: Transfer Characteristics (Note E)

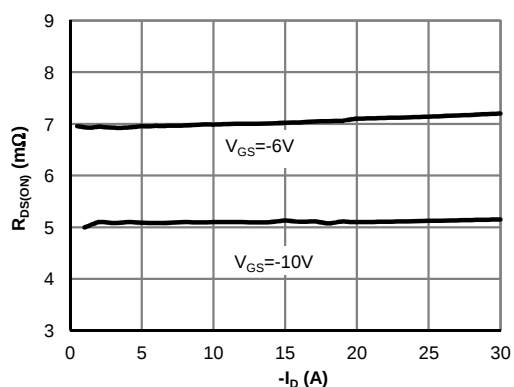


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

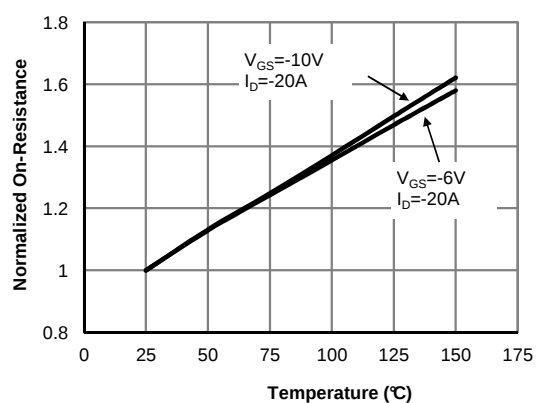


Figure 4: On-Resistance vs. Junction Temperature (Note E)

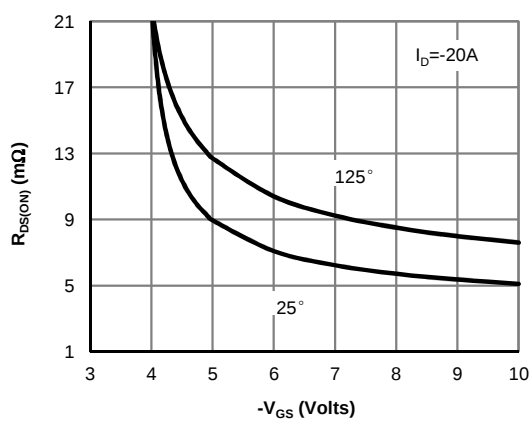


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

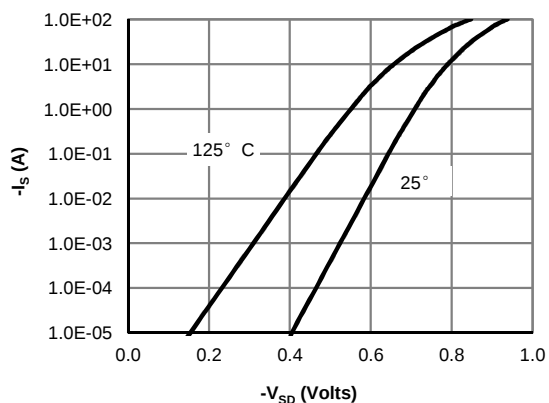
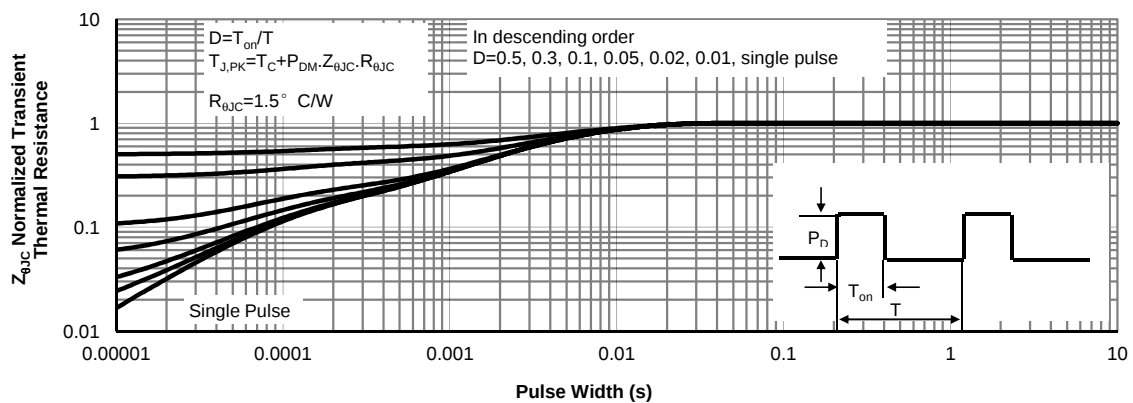
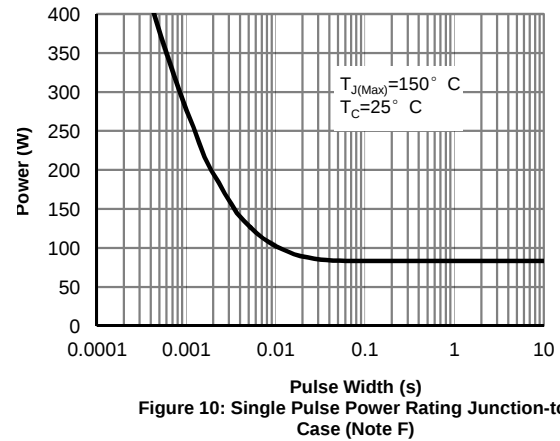
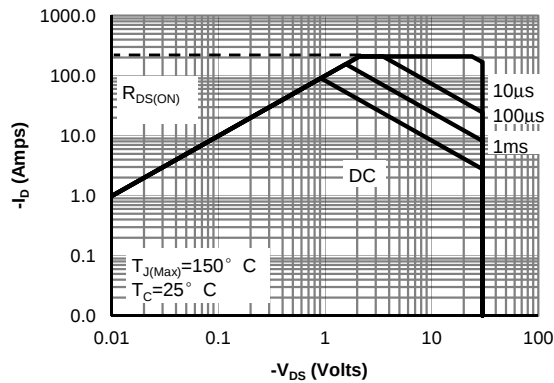
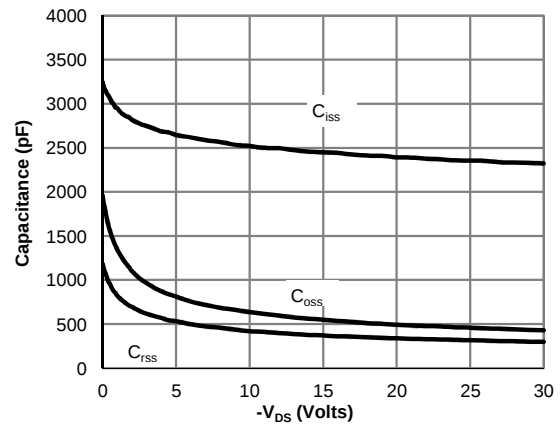
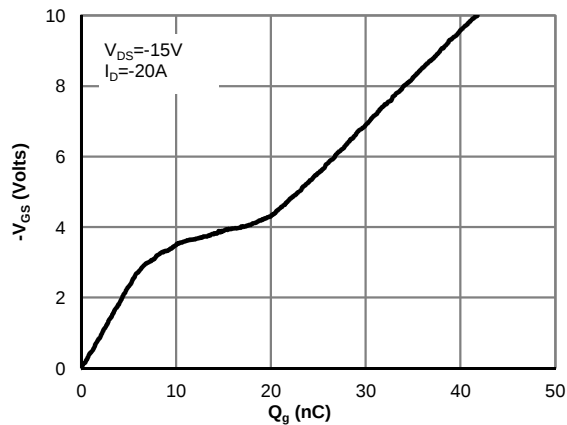


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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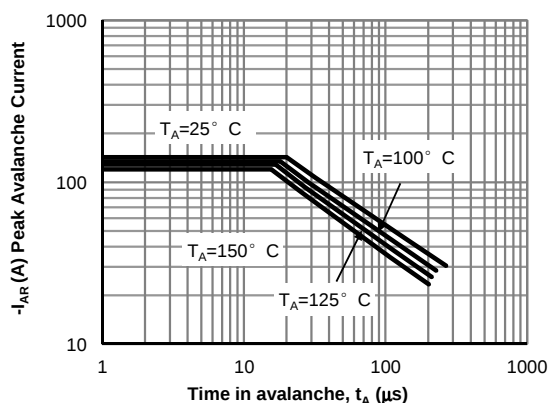


Figure 12: Single Pulse Avalanche capability (Note C)

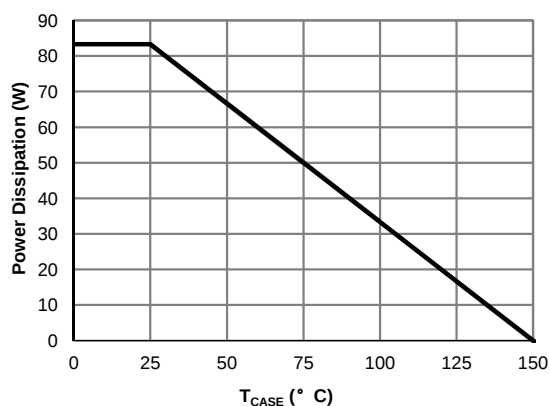


Figure 13: Power De-rating (Note F)

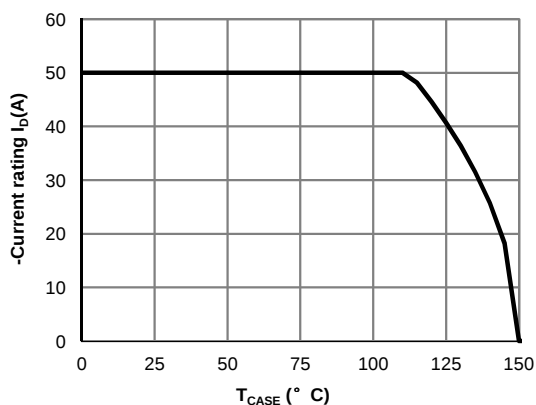


Figure 14: Current De-rating (Note F)

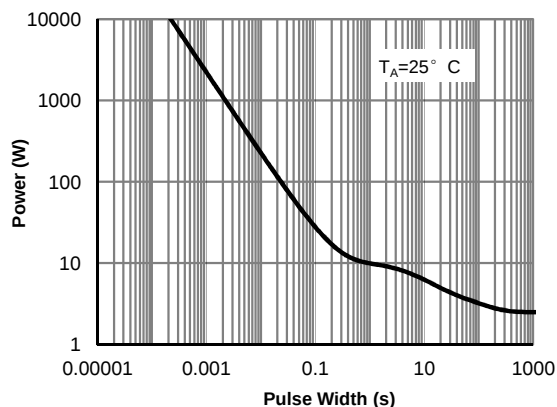


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

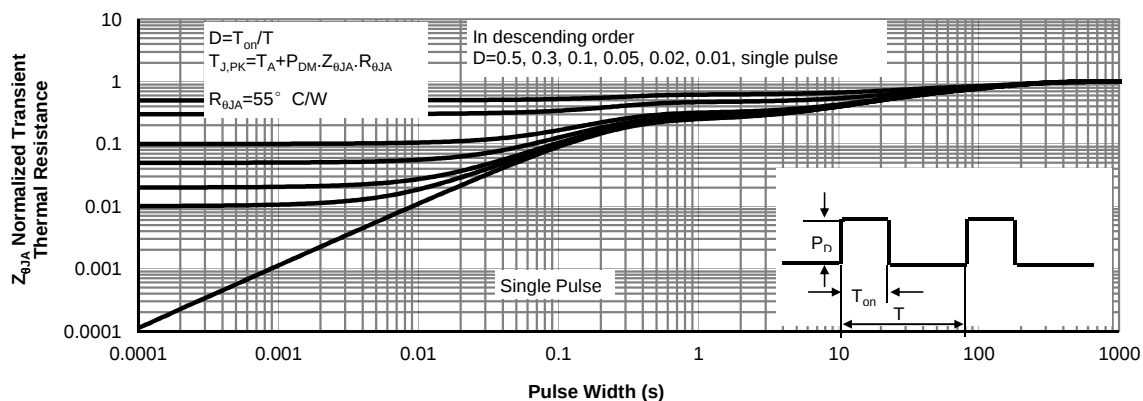
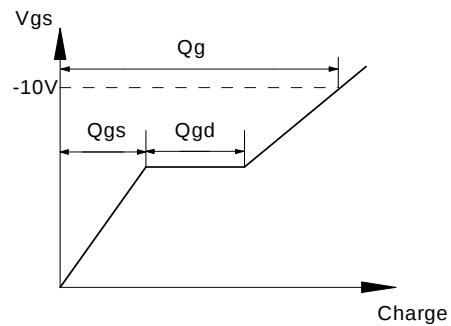
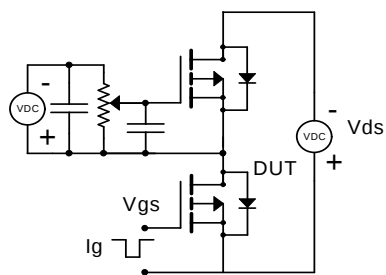
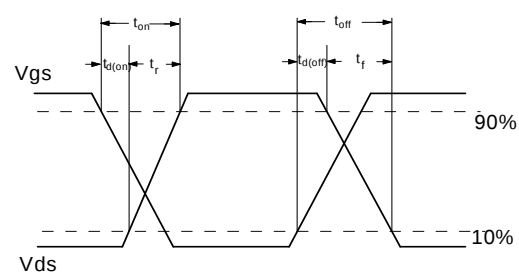
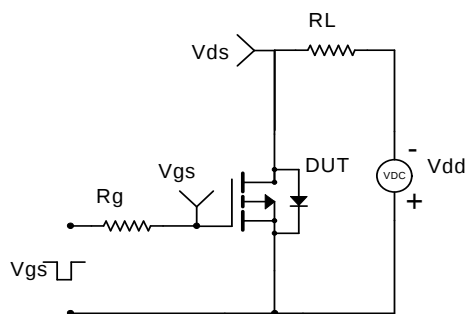


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

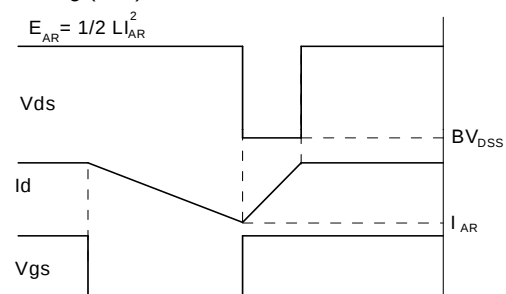
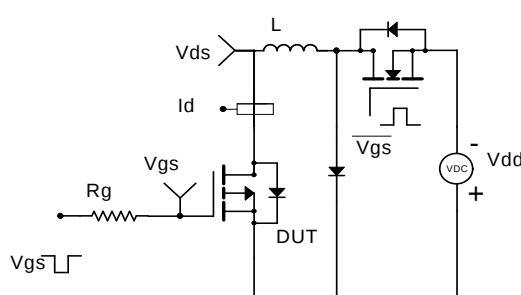
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

