

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
100V	13mΩ@10V	40A
	16mΩ@4.5V	



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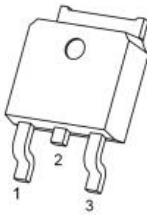
## Feature

- Fast Switching
- Low Gate Charge and R<sub>DS(on)</sub>
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test

## Applications

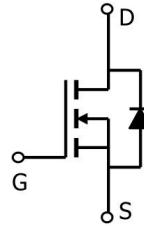
- Power switching application
- PWM Application
- DC-DC Converter

## Package

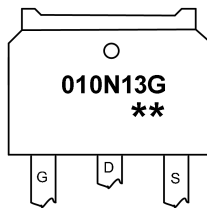


TO-252(1:G 2:D 3:S)

## Circuit diagram



## Marking



010N13G =Device Code  
\*\* =Week Code

## Order Information

Device	Package	Unite/Tape
SP010N13GTH	TO-252	2500

**Absolute maximum ratings (Ta=25°C unless otherwise noted)**

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V <sub>DS</sub>	100	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current (Tc=25°C)	I <sub>D</sub>	40	A
Pulsed Drain Current <sup>2</sup>	I <sub>DM</sub>	160	A
Single Pulse Avalanche Energy <sup>3</sup>	E <sub>AS</sub>	24	mJ
Total Power Dissipation <sup>4</sup> (Tc=25°C)	P <sub>D</sub>	52	W
Thermal Resistance Junction-Case <sup>1</sup>	R <sub>θJC</sub>	2.4	°C/W
Storage Temperature Range	T <sub>STG</sub>	-55 to 150	°C
Operating Junction Temperature Range	T <sub>J</sub>	-55 to 150	°C

**Electrical characteristics (Ta=25°C, unless otherwise noted)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	VGS=0V, ID= 250uA	100	---	---	V
Drain-Source Leakage Current	IDSS	VDS= 80V, VGS=0V, TJ=25°C	---	---	1	uA
Gate-Source Leakage Current	IGSS	VGS= ±20V, VDS=0V	---	---	±100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS, ID = 250uA	1.0	1.8	2.5	V
Static Drain-Source On-Resistance <sup>2</sup>	R <sub>DS(ON)</sub>	VGS= 10V, ID= 10A	---	13	17	mΩ
		VGS= 4.5V, ID= 6A	---	16	21	
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	VDS= 50V, VGS=0V, f=1MHz	---	770	---	pF
Output Capacitance	C <sub>oss</sub>		---	170	---	
Reverse Transfer Capacitance	C <sub>rss</sub>		---	5	---	
<b>Switching Characteristics</b>						
Total Gate Charge (4.5V)	Q <sub>g</sub>	VDS= 50V, VGS= 10V, ID= 10A	---	13	---	nC
Gate-Source Charge	Q <sub>gs</sub>		---	7	---	
Gate-Drain Charge	Q <sub>gd</sub>		---	3	---	
Turn-On Delay Time	T <sub>d(on)</sub>	VDD= 50V, ID= 10A, VGS= 10V, RGEN=6Ω	---	4.3	---	ns
Rise Time	T <sub>r</sub>		---	5	---	
Turn-Off Delay Time	T <sub>d(off)</sub>		---	17	---	
Fall Time	T <sub>f</sub>		---	9	---	
<b>Source-Drain Diode Characteristics</b>						
Diode Forward Voltage <sup>2</sup>	V <sub>SD</sub>	VGS=0V, IS= -1A, TJ=25°C	---	---	1.2	V

**Note :**

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≦ 300us, duty cycle ≦ 2%
- The EAS data shows Max. rating. The test condition is VDD=50V, VGS=10V, L=0.1mH, Rg=25Ω
- The power dissipation is limited by 150°C junction temperature

## Typical Characteristics

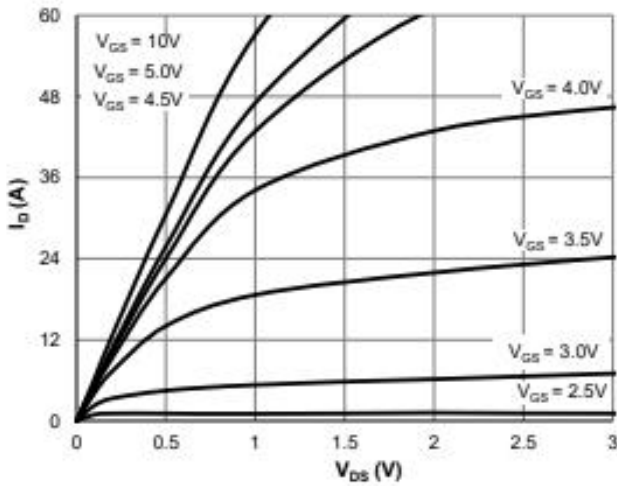


Figure 1: Saturation Characteristics

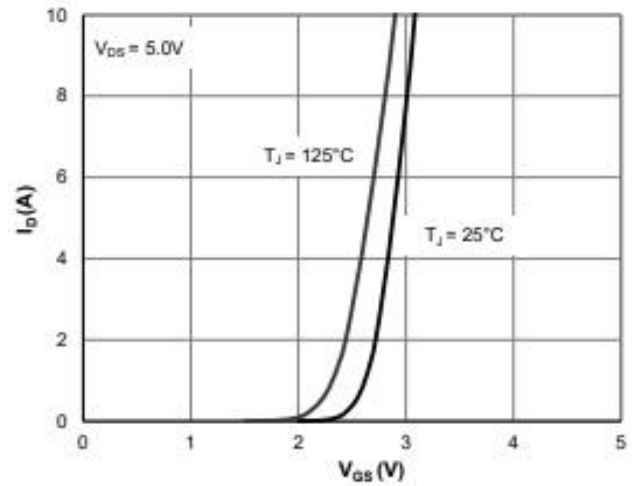


Figure 2: Transfer Characteristics

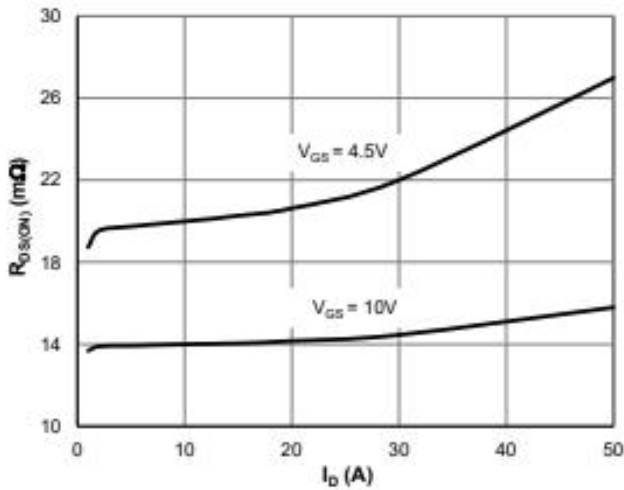


Figure 3:  $R_{DS(ON)}$  vs. Drain Current

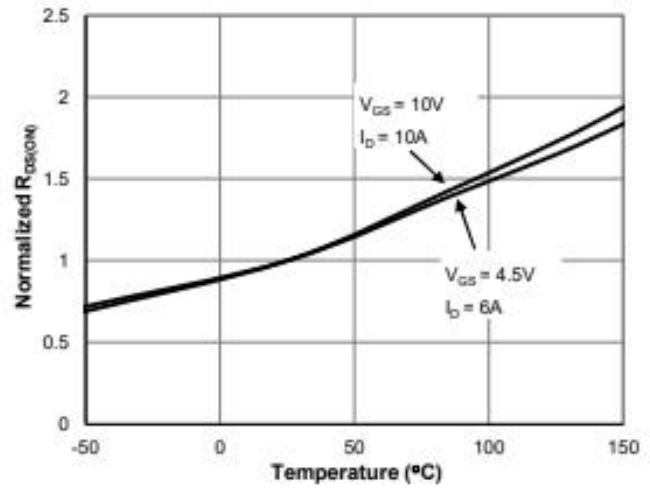


Figure 4:  $R_{DS(ON)}$  vs. Junction Temperature

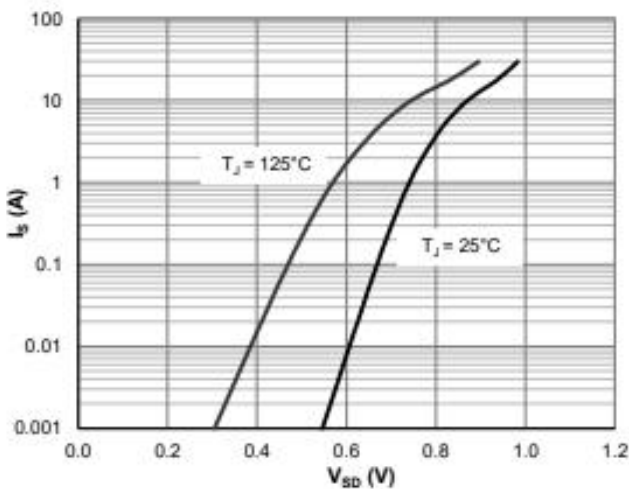


Figure 5: Body-Diode Characteristics

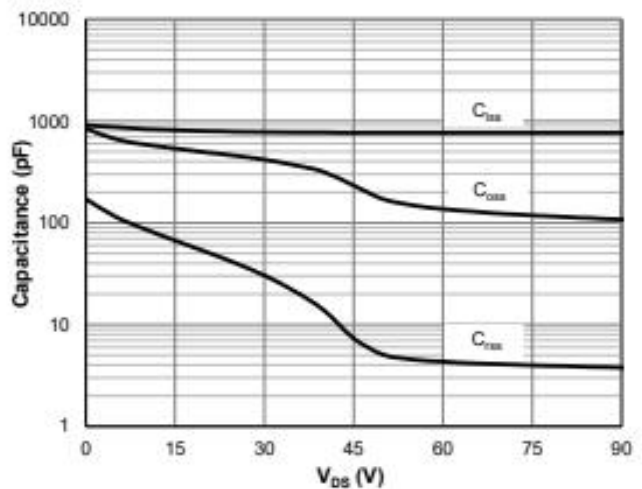


Figure 6: Capacitance Characteristics

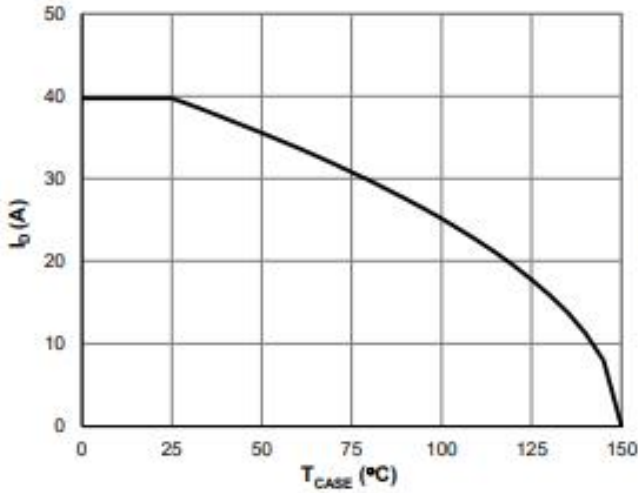


Figure 7: Current De-rating

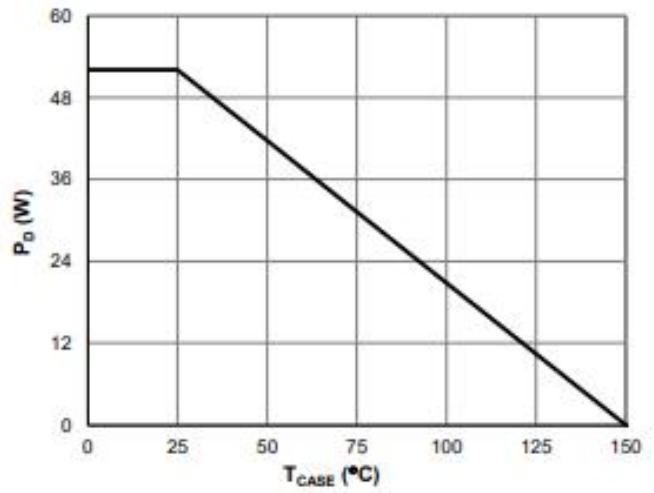


Figure 8: Power De-rating

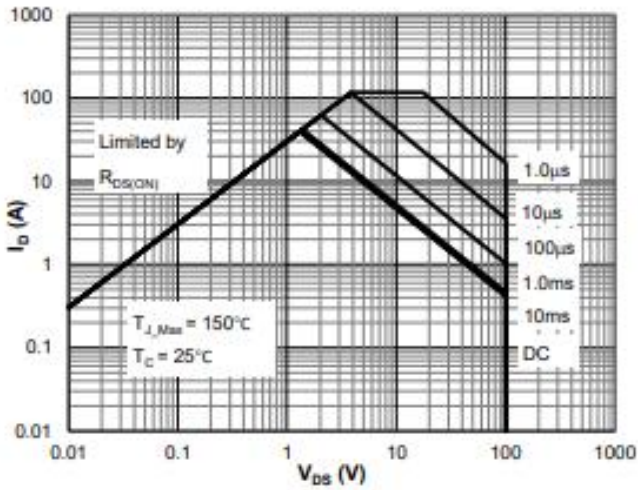


Figure 9: Maximum Safe Operating Area

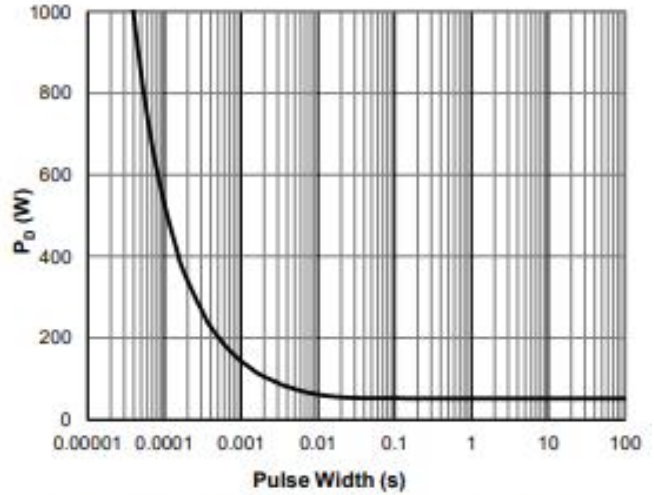


Figure 10: Single Pulse Power Rating, Junction-to-Case

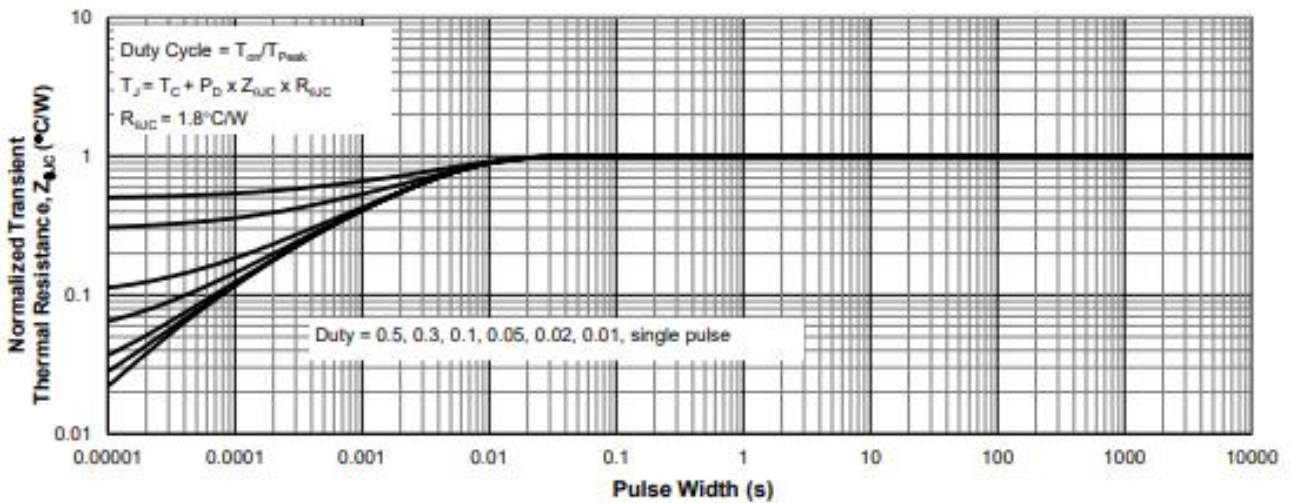
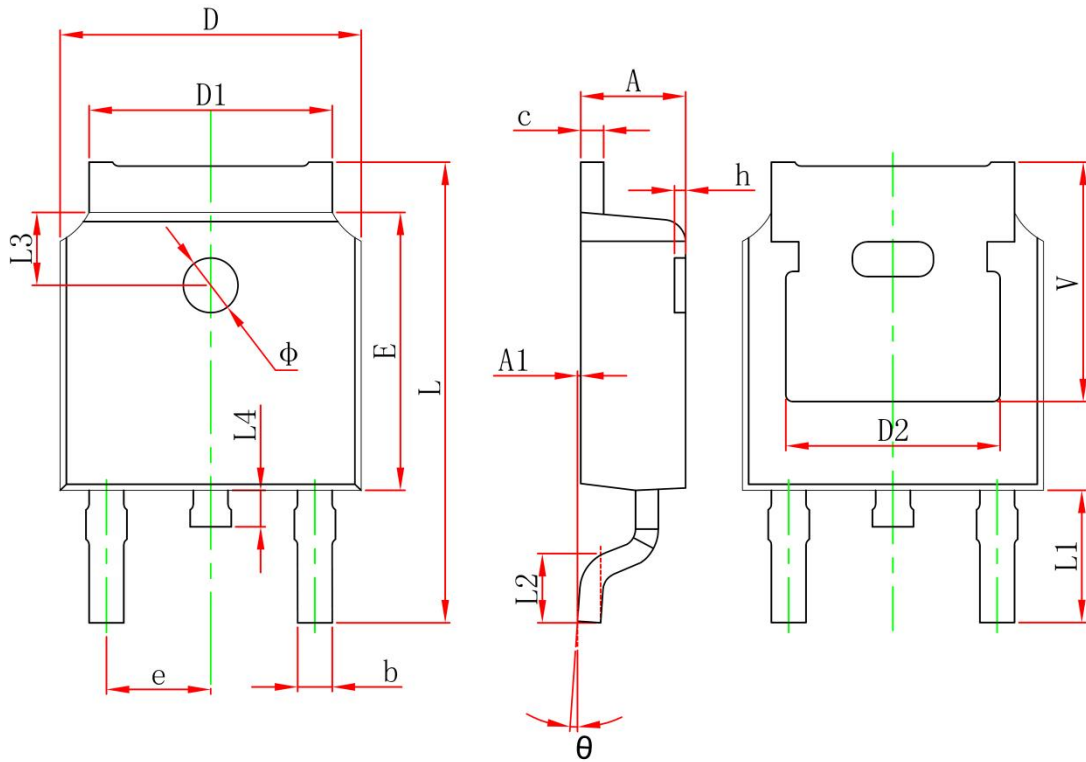


Figure 11: Normalized Maximum Transient Thermal Impedance

**TO-252 Package Information**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 REF.		0.211 REF.	

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