
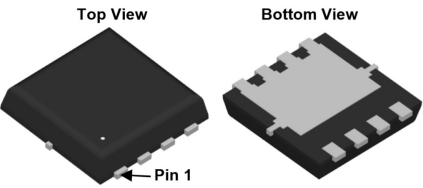




# HGS50N03A N-channel Enhancement Mode Power MOSFET

## Description

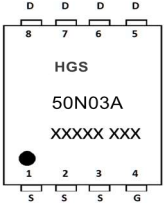
<b>Features</b> <ul style="list-style-type: none"> <li>• 30V,50A  <math>R_{DS(ON)} &lt; 4.7m\Omega @ V_{GS} = 10V</math>  <math>R_{DS(ON)} &lt; 10m\Omega @ V_{GS} = 4.5V</math></li> <li>• Advanced Trench Technology</li> <li>• Provide Excellent <math>R_{DS(ON)}</math> and Low Gate Charge</li> <li>• Lead free product is acquired</li> </ul>	<b>Application</b> <ul style="list-style-type: none"> <li>• Load Switch</li> <li>• PWM Application</li> <li>• Power management</li> </ul> <p style="text-align: center;"><i>100% UIS TESTED!</i> <i>100% <math>\Delta V_{ds}</math> TESTED!</i></p>	
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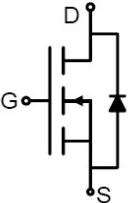
Top View      Bottom View

← Pin 1

**PDFN3.3X3.3-8L**



**Marking and pin Assignment**



**Schematic Diagram**

## Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
HGS50N03A	HGS50N03A	TAPING	PDFN3.3X3.3-8L	13inch	5000	50000

## Absolute Maximum Ratings (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Parameter	Max.	Units
V <sub>DSS</sub>	Drain-Source Voltage	30	V
V <sub>GSS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Continuous Drain Current	T <sub>C</sub> = 25°C	50
		T <sub>C</sub> = 100°C	33
I <sub>DM</sub>	Pulsed Drain Current <sup>note1</sup>	200	A
E <sub>AS</sub>	Single Pulsed Avalanche Energy <sup>note2</sup>	85	mJ
P <sub>D</sub>	Power Dissipation	20	W
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	6.25	°C/W
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C



# HGS50N03A N-channel Enhancement Mode Power MOSFET

## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,	-	-	1.0	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.5	2.5	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note3</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	3.5	4.7	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	7.0	10	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1.0MHz	-	2100	-	pF
C <sub>oss</sub>	Output Capacitance		-	326	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	282	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V	-	45	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	3	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	15	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =15V, I <sub>D</sub> =30A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V	-	21	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	32	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	59	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	34	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	50	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	200	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =30A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, di/dt=100A/μs	-	15	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	4	-	nC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

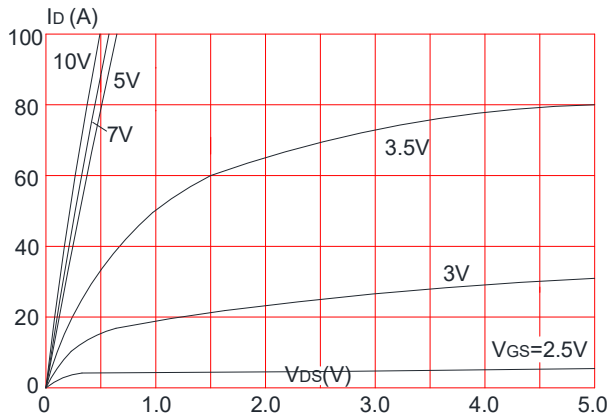
2. EAS condition: T<sub>J</sub>=25°C, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=18.4A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

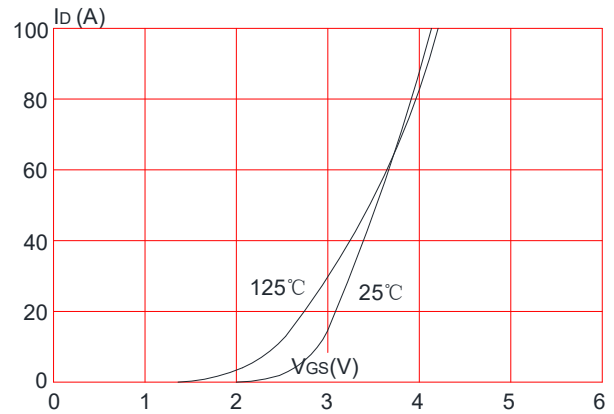


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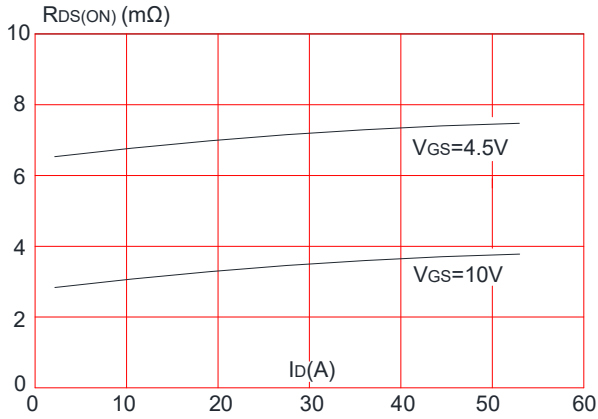
**Figure 1: Output Characteristics**



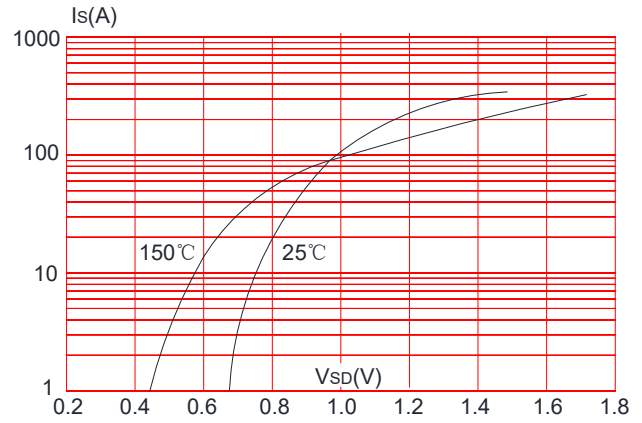
**Figure 2: Typical Transfer Characteristics**



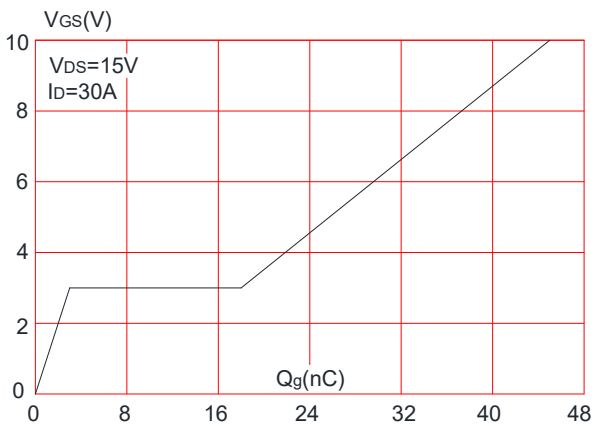
**Figure 3: On-resistance vs. Drain Current**



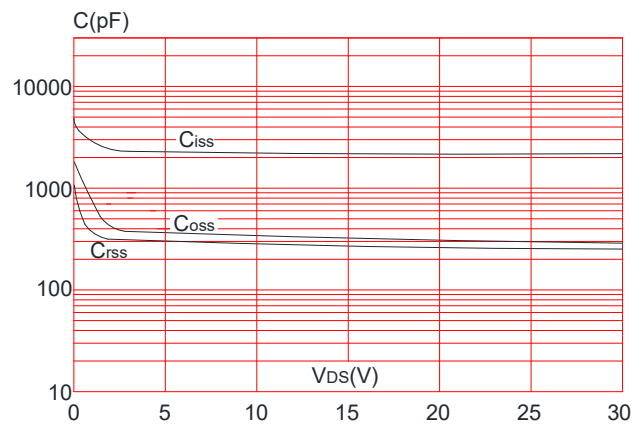
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**



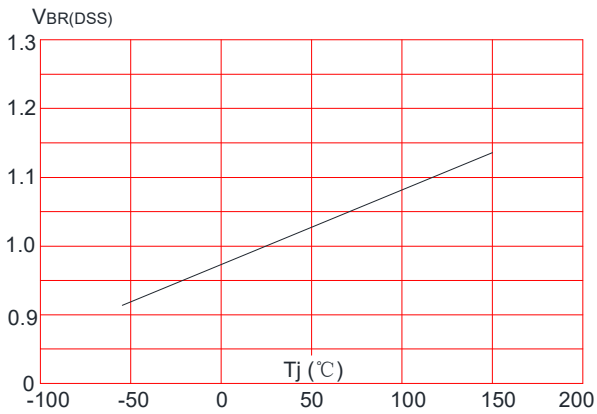
**Figure 6: Capacitance Characteristics**



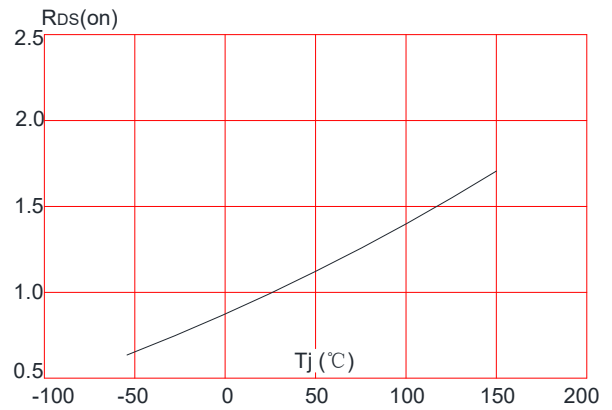


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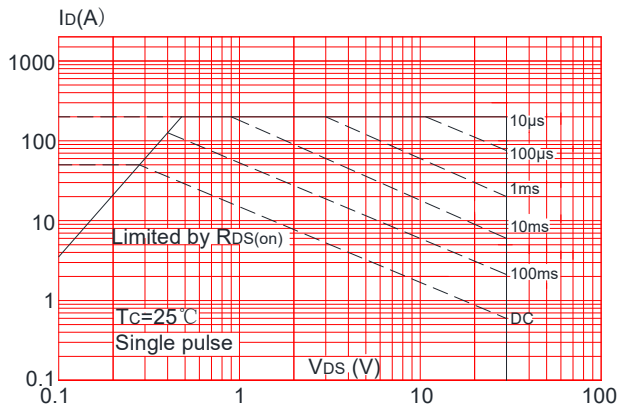
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



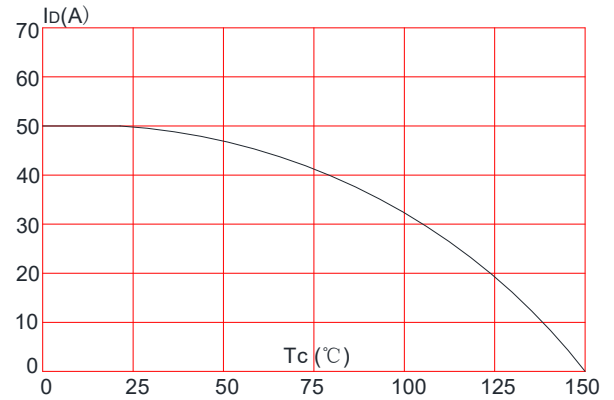
**Figure 8:** Normalized on Resistance vs. Junction Temperature



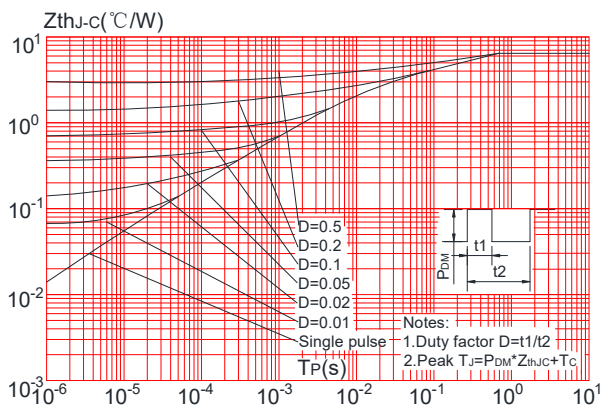
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case (PDFN3.3\*3.3-8L)





### Test Circuit



Figure1:Gate Charge Test Circuit & Waveform

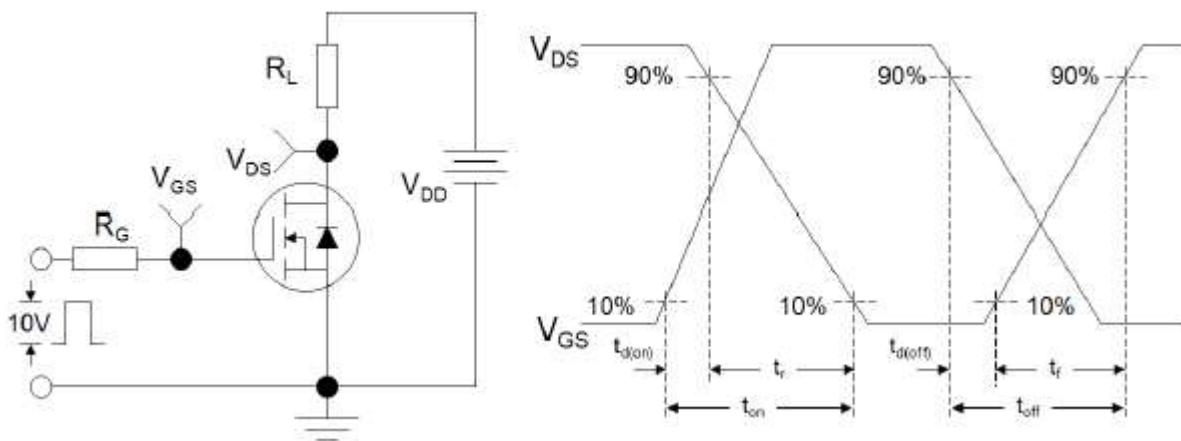


Figure 2: Resistive Switching Test Circuit & Waveforms

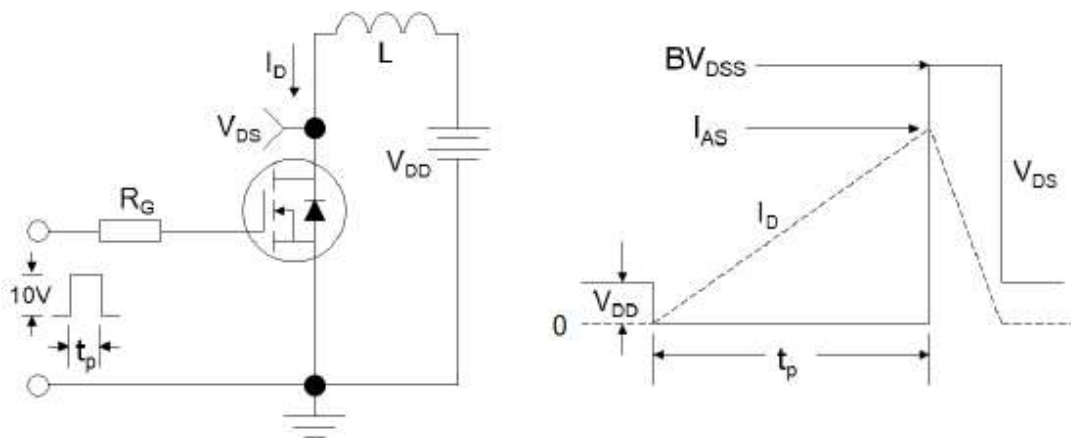
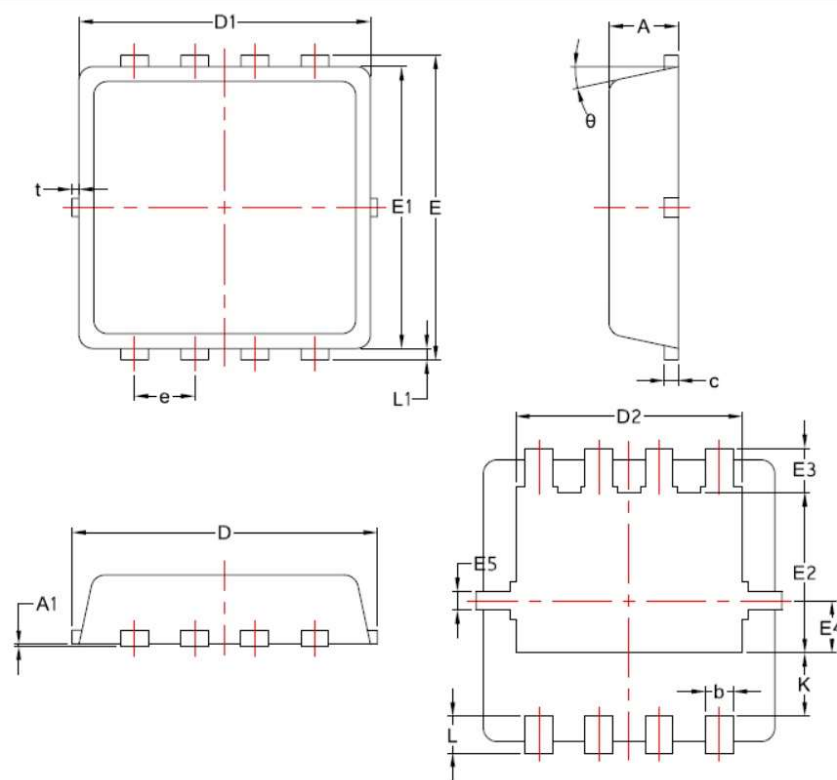


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



# HGS50N03A N-channel Enhancement Mode Power MOSFET

## Package Mechanical Data-PDFN3.3X3.3-8L



SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
θ	10°	12°	14°