




# Power MOSFETS


## DATASHEET


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**LM30C50NGI3A**

N-Channel  
Enhancement Mode MOSFET

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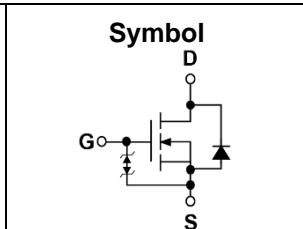
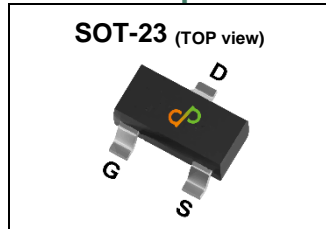


Quality Management Systems

ISO 9001:2015 Certificate

## N-Channel Enhancement Mode MOSFET

### Pin Description



### Product Summary

Symbol	N-Channel	Unit
V <sub>DSS</sub>	30	V
R <sub>DS(ON)-Max</sub>	400	mΩ
ID	0.72	A

### Feature

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- ESD Protection

### Applications

- Portable Equipment
- Battery Powered System

### Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM30C50NGI3A	SOT-23	Tape & Reel	3000/ Reel(7")	17□□□

Note : □□□ = Lot Code

### Absolute Maximum Ratings (T<sub>J</sub>=25°C Unless Otherwise Noted)

Symbol	Parameter	N-Channel	Unit	
V <sub>DSS</sub>	Drain-Source Voltage	30	V	
V <sub>GSS</sub>	Gate-Source Voltage	±12		
T <sub>J</sub>	Maximum Junction Temperature	150	°C	
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C	
I <sub>DM</sub> <sup>①</sup>	Pulse Drain Current Tested	T <sub>A</sub> =25°C	1.8	A
I <sub>D</sub>	Continuous Drain Current	T <sub>A</sub> =25°C	0.72	A
		T <sub>A</sub> =70°C	0.57	
P <sub>D</sub>	Maximum Power Dissipation	T <sub>A</sub> =25°C	0.36	W
		T <sub>A</sub> =70°C	0.23	
I <sub>AS</sub> <sup>②</sup>	Avalanche Current, Single pulse	L=0.1mH	1.8	A
E <sub>AS</sub> <sup>②</sup>	Avalanche Energy, Single pulse	L=0.1mH	0.16	mJ

### Thermal Characteristics

Symbol	Parameter	Rating	Unit	
R <sub>θJA</sub> <sup>③</sup>	Thermal Resistance-Junction to Ambient	Steady State	350	°C/W

Note ① : Max. current is limited by junction temperature.

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C

Note ③ : Surface Mounted on 1in<sup>2</sup> FR-4 board with 1oz.

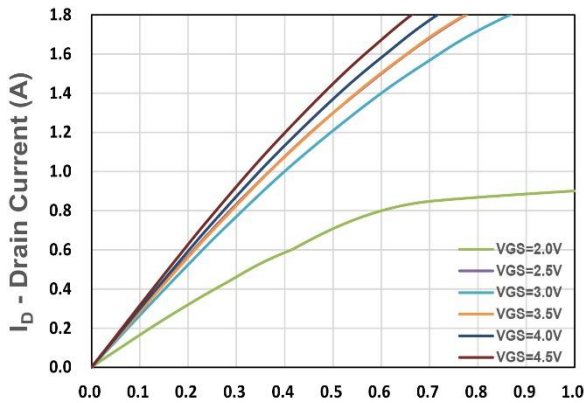
## N-Channel Electrical Characteristics (T<sub>J</sub>=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics</b>						
<b>BV<sub>DSS</sub></b>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250uA	30	-	-	V
<b>I<sub>DSS</sub></b>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V	-	-	1	uA
<b>V<sub>GS(th)</sub></b>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250uA	0.6	0.85	1.1	V
<b>I<sub>GSS</sub></b>	Gate Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±10	uA
<b>R<sub>DS(ON)</sub></b> <sup>④</sup>	Drain-Source On-state Resistance	V <sub>GS</sub> =4.5V, I <sub>DS</sub> =0.5A	-	330	400	mΩ
		V <sub>GS</sub> =2.5V, I <sub>DS</sub> =0.3A	-	350	600	
		V <sub>GS</sub> =1.8V, I <sub>DS</sub> =0.1A	-	600	825	
<b>gfs</b>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>DS</sub> =0.25A	-	5.7	-	S
<b>Dynamic Characteristics</b> <sup>⑤</sup>						
<b>R<sub>G</sub></b>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, Freq.=1MHz	-	195	-	Ω
<b>C<sub>iss</sub></b>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, Freq.=1MHz	-	38.2	-	pF
<b>C<sub>oss</sub></b>	Output Capacitance					
<b>C<sub>rss</sub></b>	Reverse Transfer Capacitance					
<b>td(ON)</b>	Turn-on Delay Time	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =1A, R <sub>GEN</sub> =6Ω	-	5.4	-	nS
<b>t<sub>r</sub></b>	Turn-on Rise Time					
<b>t<sub>d(OFF)</sub></b>	Turn-off Delay Time					
<b>t<sub>f</sub></b>	Turn-off Fall Time					
<b>Q<sub>g</sub></b>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =1A	-	0.86	-	nC
<b>Q<sub>gs</sub></b>	Gate-Source Charge					
<b>Q<sub>gd</sub></b>	Gate-Drain Charge					
<b>Source-Drain Characteristics</b>						
<b>V<sub>SD</sub></b> <sup>④</sup>	Diode Forward Voltage	I <sub>SD</sub> =0.25A, V <sub>GS</sub> =0V	-	0.9	1.1	V
<b>t<sub>rr</sub></b>	Reverse Recovery Time	I <sub>F</sub> =0.25A, V <sub>R</sub> =20V	-	24.2	-	nS
<b>Q<sub>rr</sub></b>	Reverse Recovery Charge	dI <sub>F</sub> /dt=100A/μs	-	3.2	-	nC

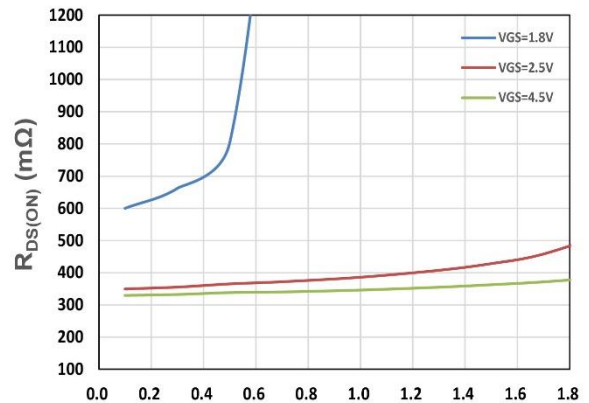
Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

Note ⑤ : Guaranteed by design, not subject to production testing.

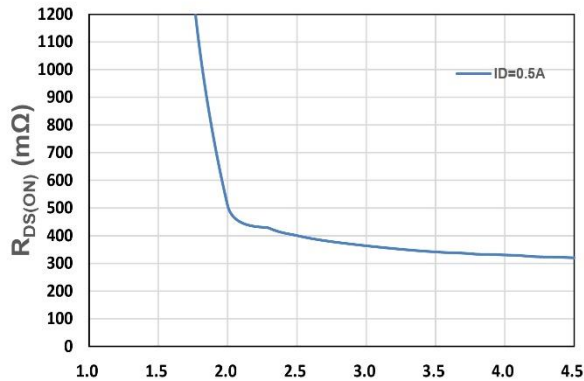
## N-Channel Typical Characteristics



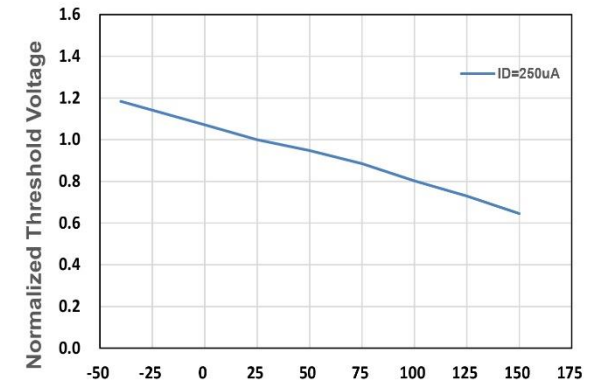
$V_{DS}$  - Drain - Source Voltage (V)  
Figure 1. Output Characteristics



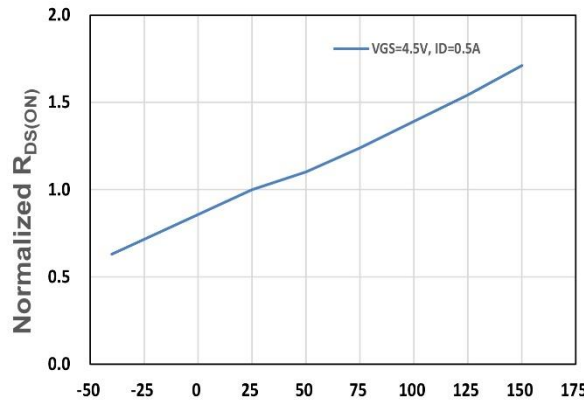
$I_D$  - Drain Current (A)  
Figure 2. On-Resistance vs. ID



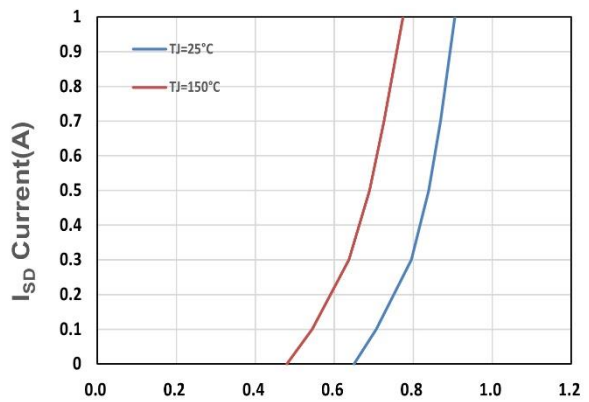
$V_{GS}$  - Gate - Source Voltage (V)  
Figure 3. On-Resistance vs. VGS



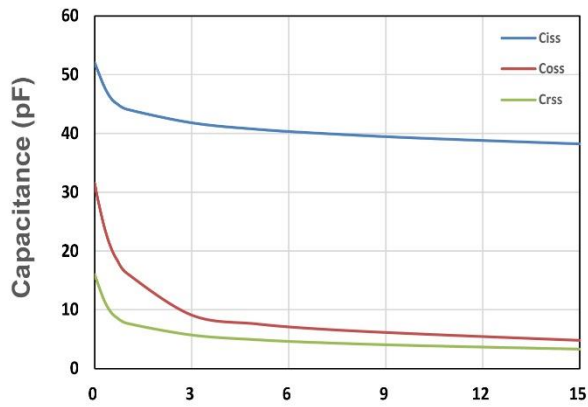
$T_j$ , Junction Temperature( $^{\circ}C$ )  
Figure 4. Gate Threshold Voltage



$T_j$ , Junction Temperature( $^{\circ}C$ )  
Figure 5. Drain-Source On Resistance

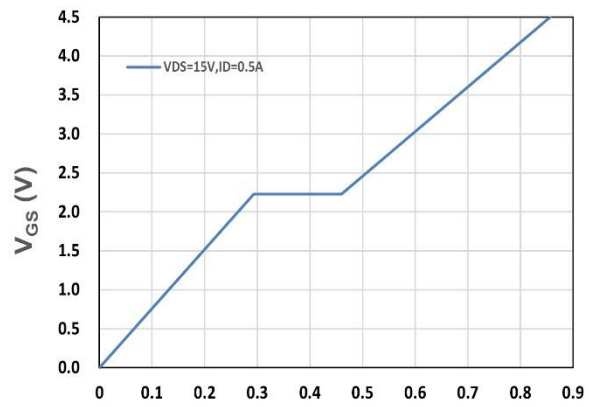


$V_{SD}$ , Source-Drain Voltage(V)  
Figure 6. Source-Drain Diode Forward



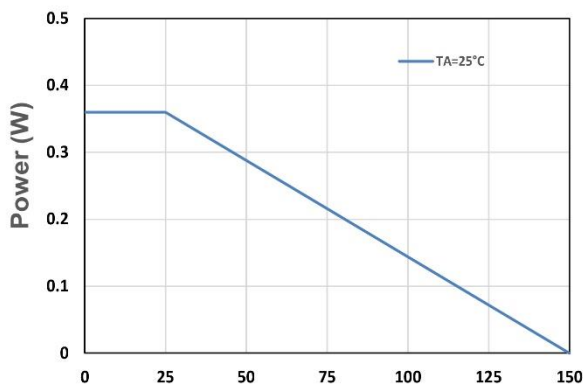
$V_{DS}$  - Drain - Source Voltage (V)

Figure 7. Capacitance



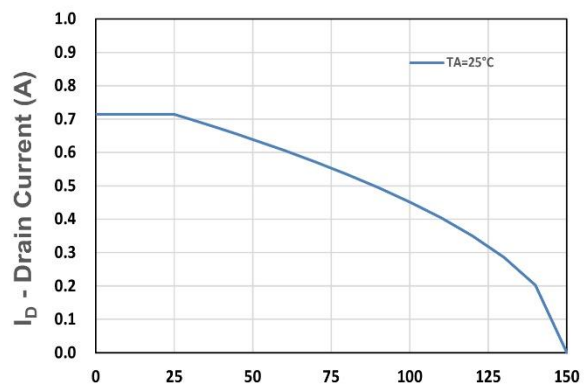
$Q_g$ , Total Gate Charge (nC)

Figure 8. Gate Charge Characteristics



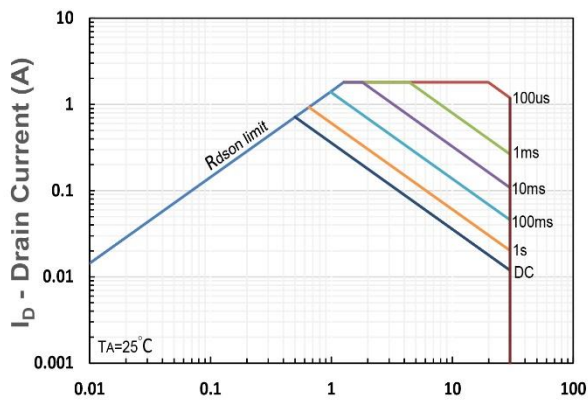
$T_A$  - Junction Temperature ( $^{\circ}C$ )

Figure 9. Power Dissipation



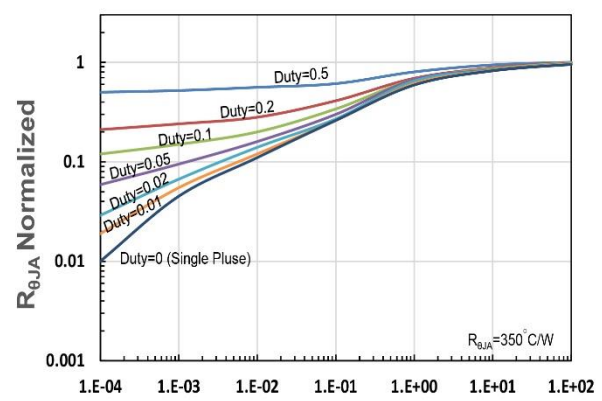
$T_A$  - Junction Temperature ( $^{\circ}C$ )

Figure 10. Drain Current



$V_{DS}$  - Drain-Source Voltage (V)

Figure 11. Safe Operating Area



$t_1$ , Square Wave Pulse Duration(s)

Figure 12.  $R_{\theta JA}$  Transient Thermal Impedance