

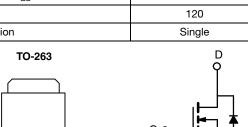
Top View

www.vishay.com

Vishay Siliconix

# Automotive N-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY				
V <sub>DS</sub> (V)	60			
$R_{DS(on)}(\Omega)$ at $V_{GS} = 10 \text{ V}$	0.0035			
$R_{DS(on)}(\Omega)$ at $V_{GS} = 4.5 \text{ V}$	0.0039			
I <sub>D</sub> (A)	120			
Configuration	Single			



#### **FEATURES**

- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- AEC-Q101 Qualifiedd
- 100 % R<sub>a</sub> and UIS Tested
- Material categorization:
   For definitions of compliance please see <a href="https://www.vishay.com/doc?99912">www.vishay.com/doc?99912</a>



FREE

ORDERING INFORMATION	
Package	TO-263
Lead (Pb)-free and Halogen-free	SQM120N06-3m5L-GE3

N-Channel MOSFET

PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-Source Voltage		$V_{DS}$	60	.,	
Gate-Source Voltage		V <sub>GS</sub>	± 20	V	
Continuous Drain Current <sup>a</sup>	T <sub>C</sub> = 25 °C	- I <sub>D</sub>	120		
	T <sub>C</sub> = 125 °C		120		
Continuous Source Current (Diode Conduction) <sup>a</sup>		I <sub>S</sub>	120	А	
Pulsed Drain Current <sup>b</sup>		I <sub>DM</sub>	480		
Single Pulse Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	100		
Single Pulse Avalanche Energy	L = U.1 MH	E <sub>AS</sub>	500	mJ	
Maximum Power Dissipation <sup>b</sup>	T <sub>C</sub> = 25 °C	D_	375	W	
	T <sub>C</sub> = 125 °C		125	VV	
Operating Junction and Storage Temperatur	re Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	LIMIT	UNIT	
Junction-to-Ambient	PCB Mount <sup>c</sup>	$R_{thJA}$	40	°C/W	
Junction-to-Case (Drain)		$R_{thJC}$	0.4	C/VV	

### Notes

- a. Package limited.
- b. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%.$
- c. When mounted on 1" square PCB (FR-4 material).
- d. Parametric verification ongoing.



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PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static					•			
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0$ , $I_D = 250 \mu A$		60	-	-	V	
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \mu A$		1.5	2.0	2.5	V	
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$		-	-	± 100	nΑ	
Zero Gate Voltage Drain Current		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 60 V	-	-	1		
	I <sub>DSS</sub>	$V_{GS} = 0 V$	V <sub>DS</sub> = 60 V, T <sub>J</sub> = 125 °C	-	-	50	μA	
		$V_{GS} = 0 V$	V <sub>DS</sub> = 60 V, T <sub>J</sub> = 175 °C	-	-	900		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>GS</sub> = 10 V	$V_{DS} \ge 5 V$	120	-	-	Α	
Drain-Source On-State Resistance <sup>a</sup>		V <sub>GS</sub> = 10 V	I <sub>D</sub> = 30 A	-	0.0028	0.0035	Ω	
	Б	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C	-	-	0.0064		
	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C	-	-	0.0080		
		V <sub>GS</sub> = 4.5 V	I <sub>D</sub> = 20 A	-	0.0031	0.0039		
Forward Transconductanceb	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A		-	190	-	S	
Dynamic <sup>b</sup>								
Input Capacitance	C <sub>iss</sub>		V <sub>DS</sub> = 25 V, f = 1 MHz	-	11 755	14 700	pF	
Output Capacitance	C <sub>oss</sub>	$V_{GS} = 0 V$		-	1112	1400		
Reverse Transfer Capacitance	C <sub>rss</sub>			-	481	605		
Total Gate Charge <sup>c</sup>	Qg			-	220	330		
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>	V <sub>GS</sub> = 10 V	V <sub>DS</sub> = 30 V, I <sub>D</sub> = 110 A	-	35	-	nC	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			-	35	-		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		0.6	1.3	2	Ω	
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>			-	19	29		
Rise Time <sup>c</sup>	t <sub>r</sub>	$V_{DD} = 30 \text{ V}, \text{ R}_L = 0.27 \Omega$ $I_D \cong 110 \text{ A}, \text{ V}_{GEN} = 10 \text{ V}, \text{ R}_g = 2.5 \Omega$		-	23	35	ns	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			-	83	125		
Fall Time <sup>c</sup>	t <sub>f</sub>			-	35	53		
Source-Drain Diode Ratings and Chara	icteristics <sup>b</sup>				•			
Pulsed Current <sup>a</sup>	I <sub>SM</sub>			-	-	480	Α	
Forward Voltage	V <sub>SD</sub>	$I_F = 50 \text{ A}, V_{GS} = 0$		_	0.8	1.5	V	

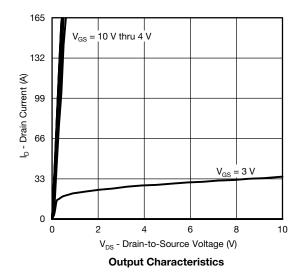
#### Notes

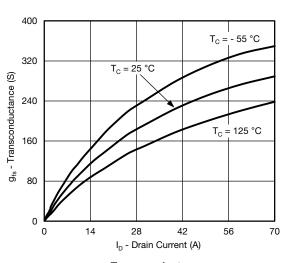
- a. Pulse test; pulse width  $\leq$  300  $\mu$ s, duty cycle  $\leq$  2 %.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

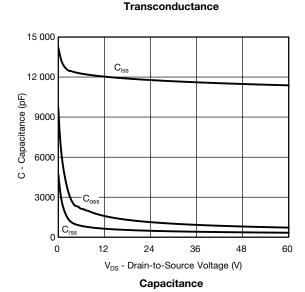
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

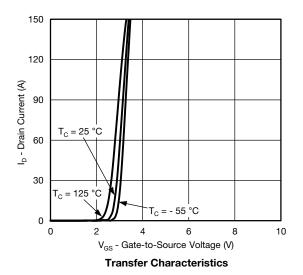


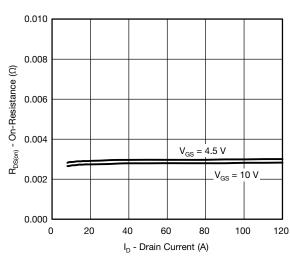
## **TYPICAL CHARACTERISTICS** (T<sub>A</sub> = 25 °C, unless otherwise noted)

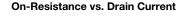


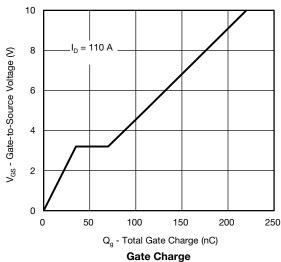






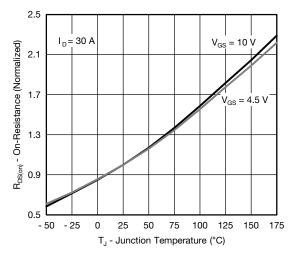




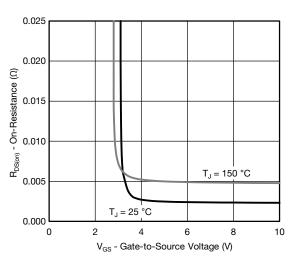




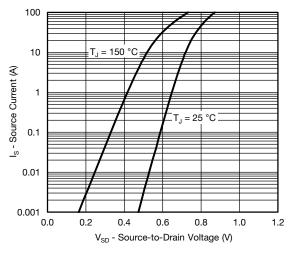
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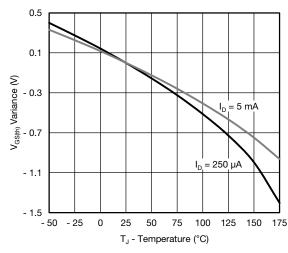
#### On-Resistance vs. Junction Temperature



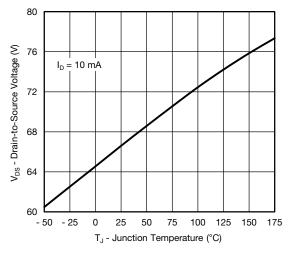
On-Resistance vs. Gate-to-Source Voltage



#### **Source Drain Diode Forward Voltage**

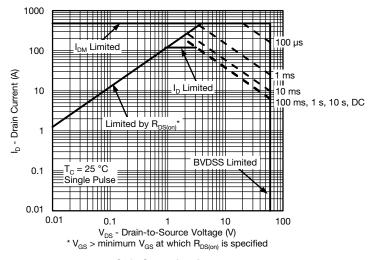


Threshold Voltage

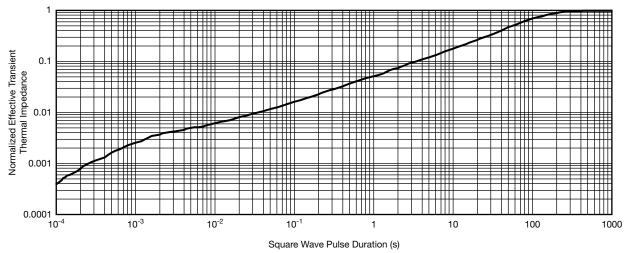


Drain Source Breakdown vs. Junction Temperature

## **THERMAL RATINGS** (T<sub>A</sub> = 25 °C, unless otherwise noted)



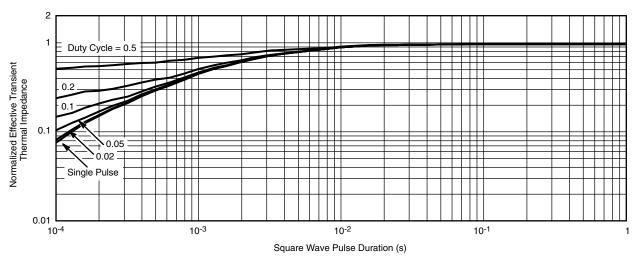
#### Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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## **THERMAL RATINGS** (T<sub>A</sub> = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

#### Note

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Case (25 °C) are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <a href="https://www.vishay.com/ppg263814">www.vishay.com/ppg263814</a>.



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Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.

Revision: 02-Oct-12 Document Number: 91000

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многоканальный

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