



**THE DATASHEET OF
SQ7002K-T1-GE3**

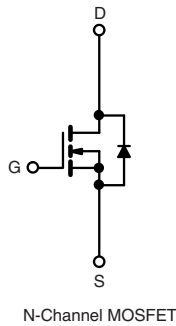
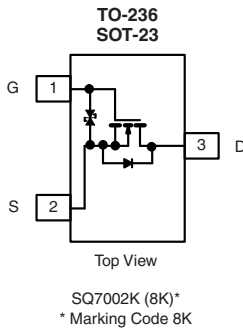


Automotive N-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V _{DS} (V)	60
R _{DS(on)} (Ω) at V _{GS} = 10 V	1.30
R _{DS(on)} (Ω) at V _{GS} = 4.5 V	1.90
I _D (A)	0.32
Configuration	Single

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- AEC-Q101 Qualified^d
- ESD Protection 2000 V
- Compliant to RoHS Directive 2002/95/EC



ORDERING INFORMATION	
Package	SOT-23
Lead (Pb)-free and Halogen-free	SQ7002K-T1-GE3

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	60	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current ^a	I _D	T _C = 25 °C	A
		T _C = 125 °C	
Continuous Source Current (Diode Conduction) ^a	I _S	0.32	A
Pulsed Drain Current ^b	I _{DM}	0.8	
Maximum Power Dissipation ^b	P _D	T _C = 25 °C	W
		T _C = 125 °C	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to + 175	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	R _{thJA}	350	°C/W
Junction-to-Foot (Drain)	R _{thJF}	300	

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

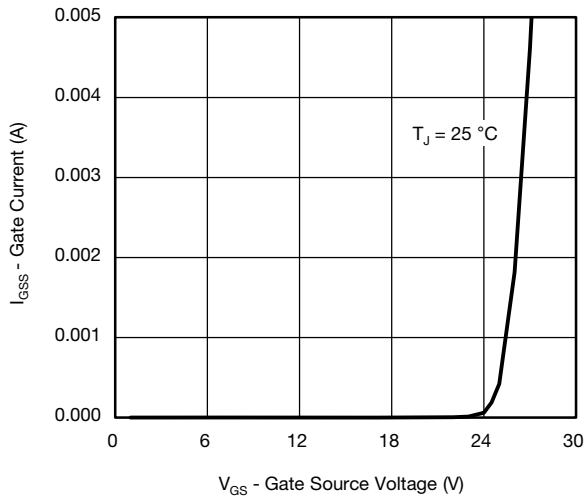
SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$		60	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$		1.0	1.8	2.5	
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$		-	-	± 50	μA
		$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 12\text{ V}$		-	-	± 1	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 60\text{ V}$	-	-	1	μA
		$V_{GS} = 0\text{ V}$	$V_{DS} = 60\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 60\text{ V}$, $T_J = 175\text{ }^\circ\text{C}$	-	-	150	
On-State Drain Current ^a	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	0.5	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 0.5\text{ A}$	-	1.07	1.30	Ω
		$V_{GS} = 10\text{ V}$	$I_D = 0.5\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$	-	-	2.33	
		$V_{GS} = 10\text{ V}$	$I_D = 0.5\text{ A}$, $T_J = 175\text{ }^\circ\text{C}$	-	-	2.97	
		$V_{GS} = 4.5\text{ V}$	$I_D = 0.2\text{ A}$	-	1.42	1.90	
Forward Transconductance ^b	g_{fs}	$V_{DS} = 10\text{ V}$, $I_D = 0.2\text{ A}$		-	100	-	S
Dynamic^b							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}$, $f = 1\text{ MHz}$	-	19	24	pF
Output Capacitance	C_{oss}			-	4.8	6	
Reverse Transfer Capacitance	C_{rss}			-	2.3	3	
Total Gate Charge ^c	Q_g	$V_{GS} = 4.5\text{ V}$	$V_{DS} = 30\text{ V}$, $I_D = 0.25\text{ A}$	-	0.9	1.4	nC
Gate-Source Charge ^c	Q_{GS}			-	0.3	-	
Gate-Drain Charge ^c	Q_{GD}			-	0.4	-	
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 150\text{ }\Omega$ $I_D \cong 0.250\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 120\text{ }\Omega$		-	14.6	22	ns
Rise Time ^c	t_r			-	15.3	23	
Turn-Off Delay Time ^c	$t_{d(off)}$			-	8.6	13	
Fall Time ^c	t_f			-	10.6	16	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) ^b							
Pulsed Current ^a	I_{SM}			-	-	0.8	A
Forward Voltage	V_{SD}	$I_F = 0.2\text{ A}$, $V_{GS} = 0\text{ V}$		-	0.83	1.2	V

Notes

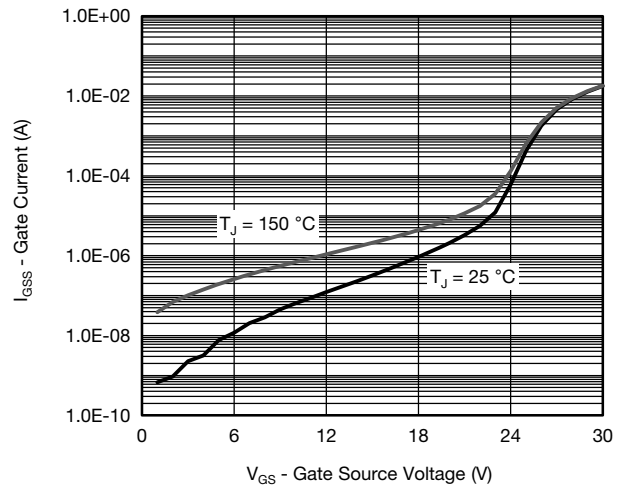
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

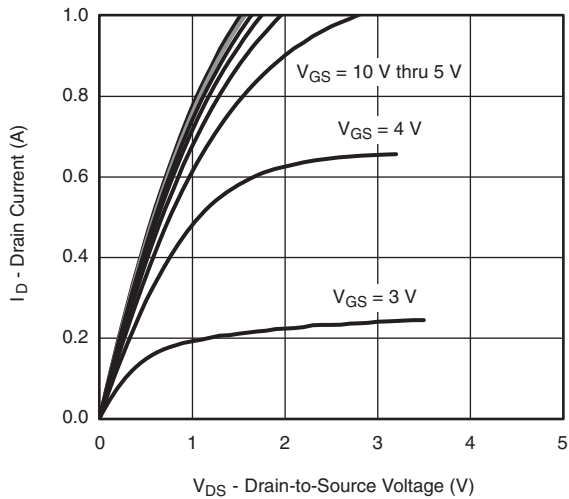
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



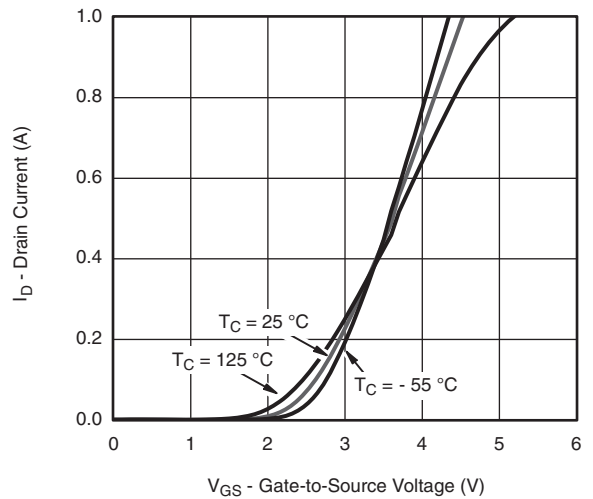
Gate Current vs. Gate-Source Voltage



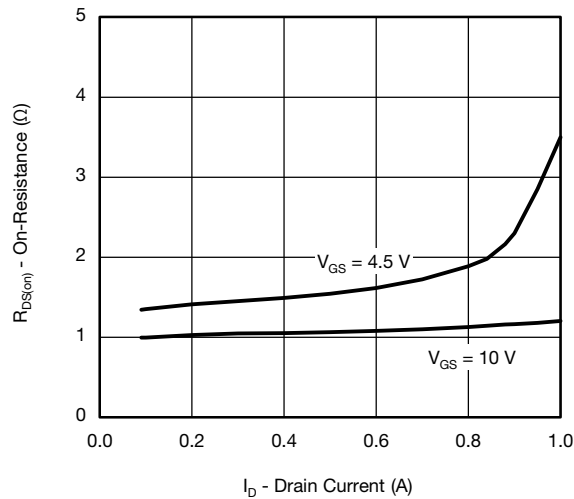
Gate Current vs. Gate-Source Voltage



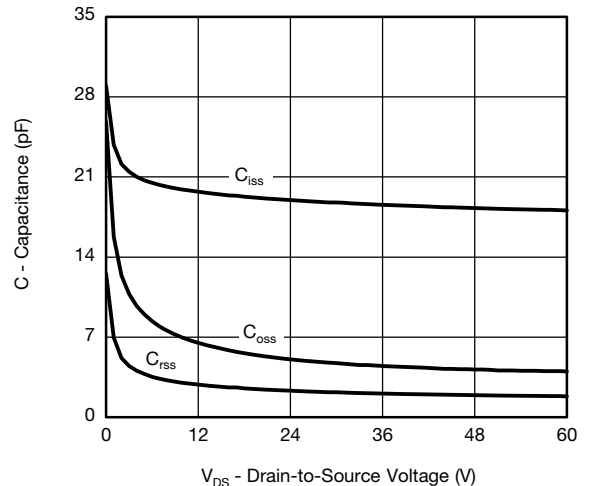
Output Characteristics



Transfer Characteristics

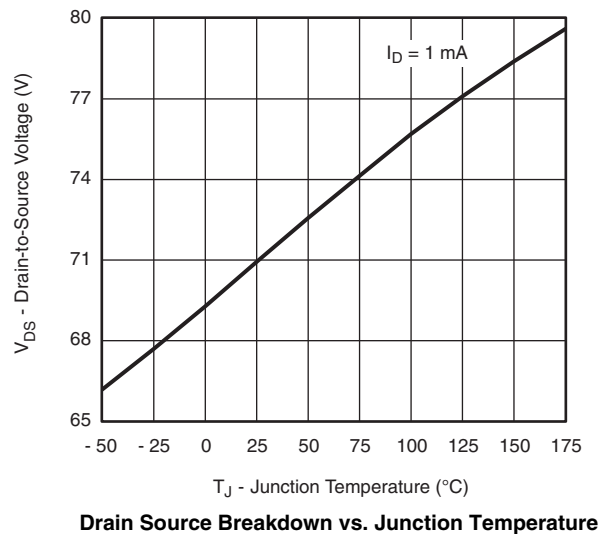
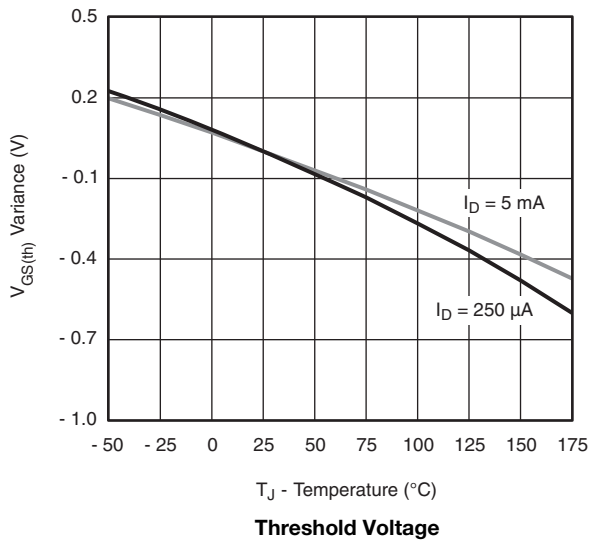
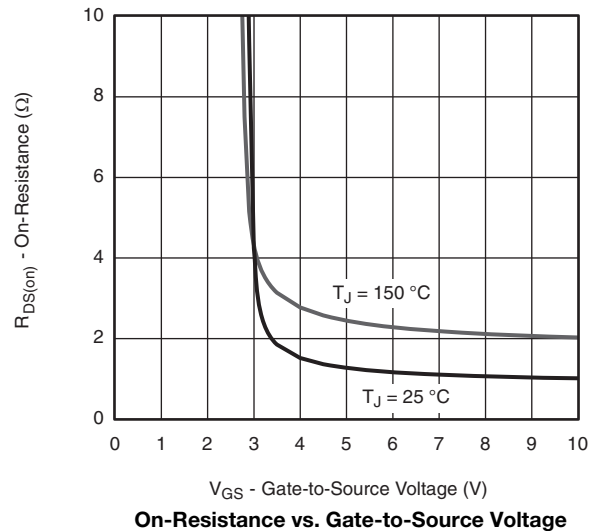
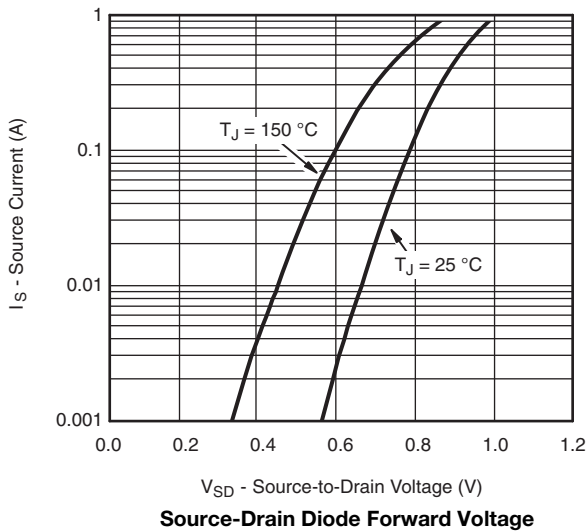
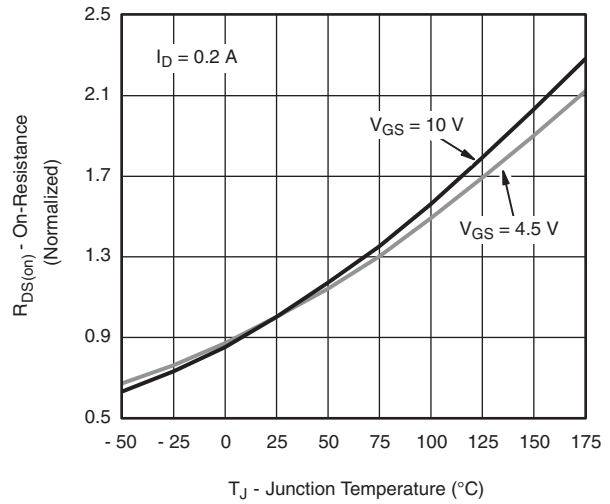
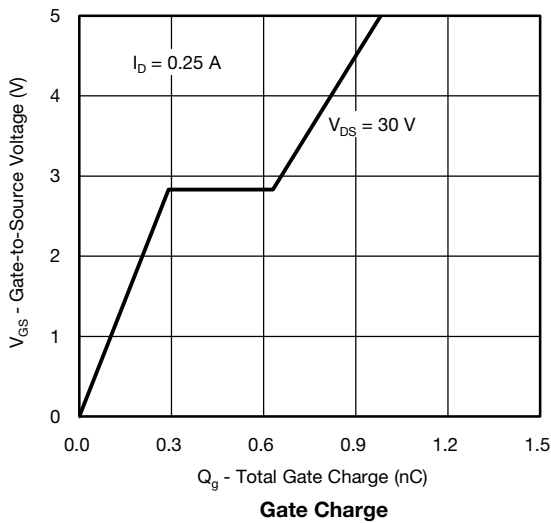


On-Resistance vs. Drain Current

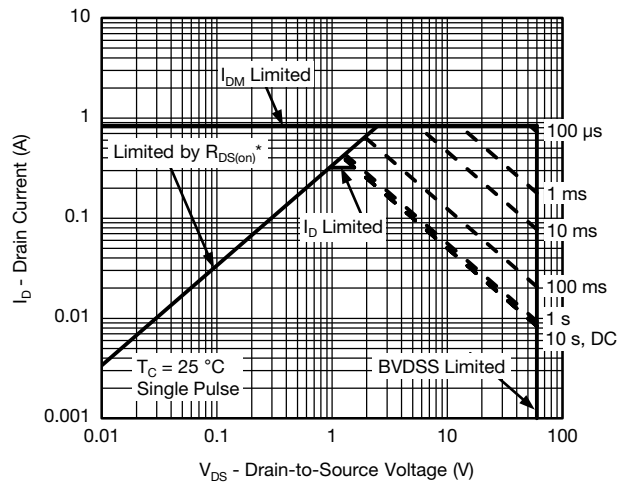


Capacitance

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)

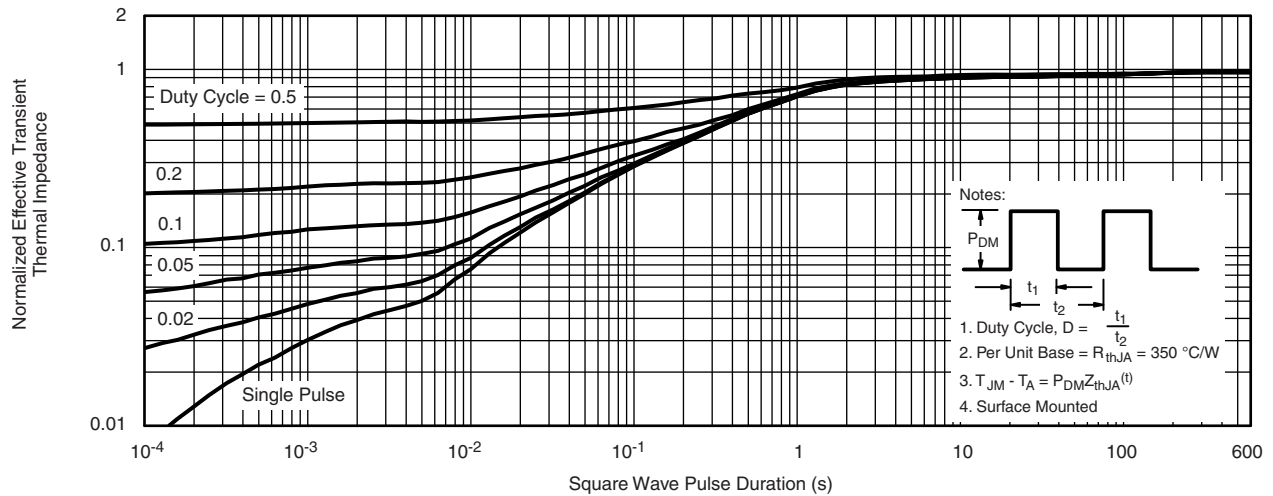


THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



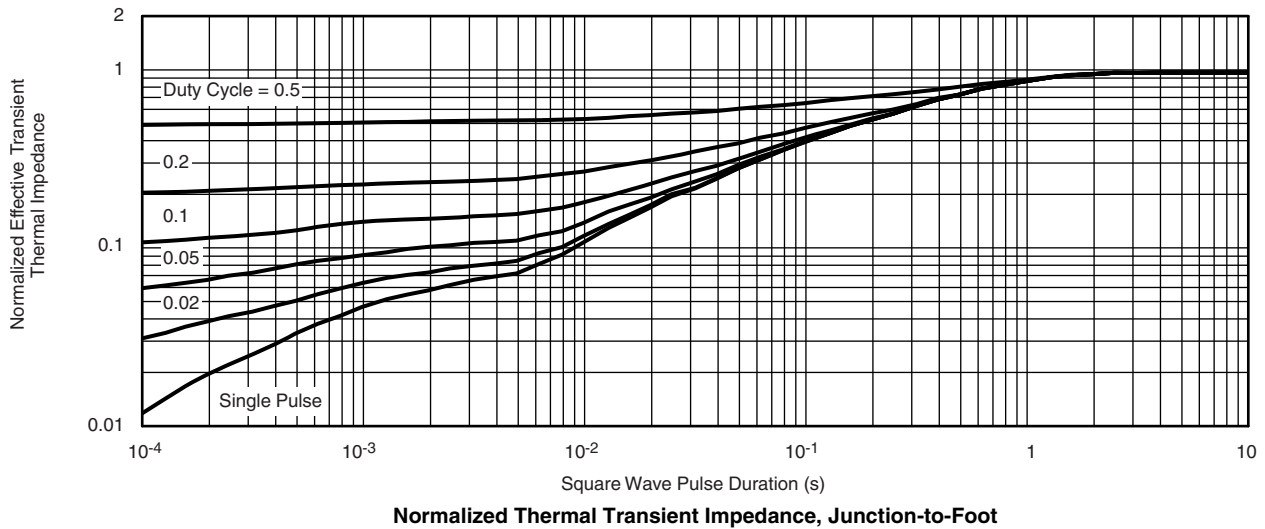
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Foot (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.

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