

EM6K7T2R-VB Datasheet

Dual N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)max}$ (Ω)	I_D (A)	Q_g (Typ.)
20	0.300 at $V_{GS} = 4.5$ V	0.6	0.75
	0.350 at $V_{GS} = 2.5$ V	0.4	
	0.420 at $V_{GS} = 1.8$ V	0.2	
	0.500 at $V_{GS} = 1.5$ V	0.05	

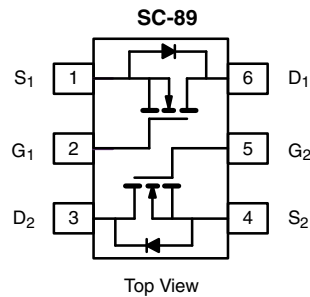
FEATURES

- Trench Power MOSFET
- 100 % R_g Tested


RoHS
 COMPLIANT

APPLICATIONS

- Load/Power Switching for Portable Devices
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	$T_A = 25^\circ\text{C}$	I_D	A
	$T_A = 70^\circ\text{C}$		
Pulsed Drain Current	I_{DM}	2	
Continuous Source-Drain Diode Current	$T_A = 25^\circ\text{C}$	I_S	A
Maximum Power Dissipation ^a	$T_A = 25^\circ\text{C}$	P_D	W
	$T_A = 70^\circ\text{C}$		
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^b	R_{thJA}	470	565	$^\circ\text{C/W}$
		560	675	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

 b. $t = 5$ s.

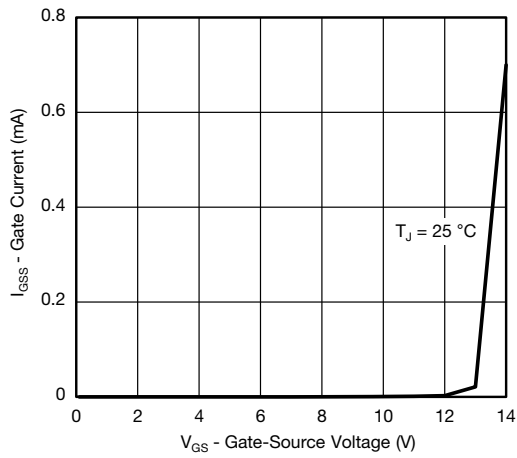
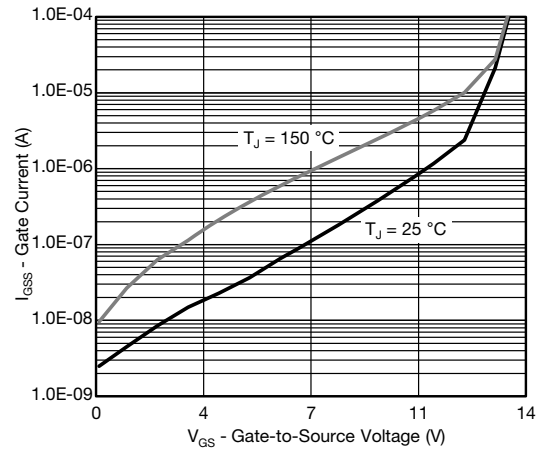
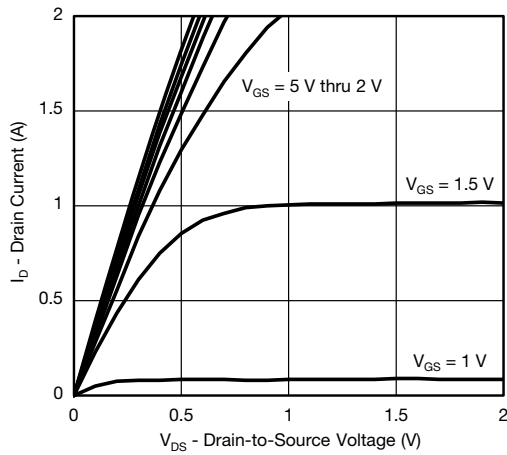
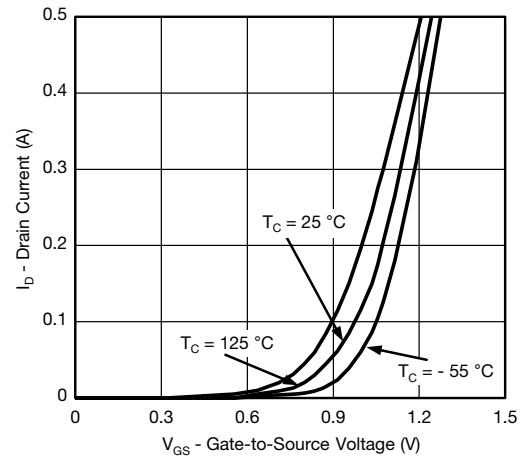
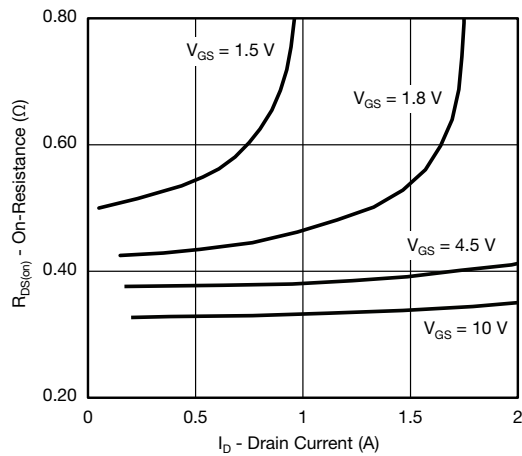
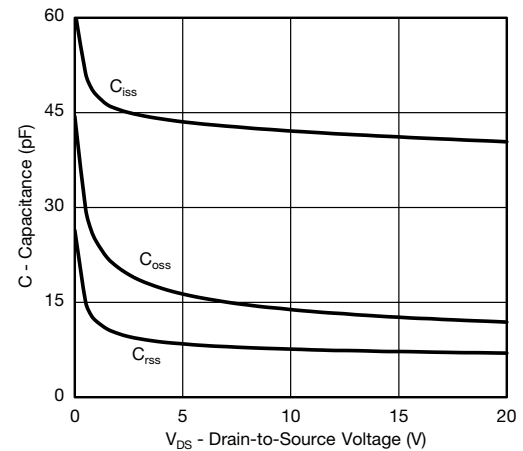
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		17		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 1.8		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.4		1	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 30	μA
		V _{DS} = 0 V, V _{GS} = ± 4.5 V			± 1	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 85 °C			3	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 4.5 V	2			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 0.5 A		0.300		Ω
		V _{GS} = 2.5 V, I _D = 0.2 A		0.350		
		V _{GS} = 1.8 V, I _D = 0.2 A		0.420		
		V _{GS} = 1.5 V, I _D = 0.05 A		0.500		
Forward Transconductance	g _{fs}	V _{DS} = 10 V, I _D = 0.5 A		7.5		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		43		pF
Output Capacitance	C _{oss}			14		
Reverse Transfer Capacitance	C _{rss}			8		
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 8 V, I _D = 0.6 A		1.3	2	nC
		V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 0.6 A		0.75	1.2	
Gate-Source Charge	Q _{gs}			0.15		
Gate-Drain Charge	Q _{gd}			0.13		
Gate Resistance	R _g	f = 1 MHz	2.4	12.2	24.4	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 20 Ω I _D ≅ 0.5 A, V _{GEN} = 4.5 V, R _g = 1 Ω		11	20	ns
Rise Time	t _r			16	24	
Turn-Off Delay Time	t _{d(off)}			26	39	
Fall Time	t _f			11	20	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current ^a	I _{SM}				2	A
Body Diode Voltage	V _{SD}	I _S = 0.5 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 0.5 A, dI/dt = 100 A/μs		10	15	ns
Body Diode Reverse Recovery Charge	Q _{rr}			2	4	nC
Reverse Recovery Fall Time	t _a			5		ns
Reverse Recovery Rise Time	t _b			5		

Notes:

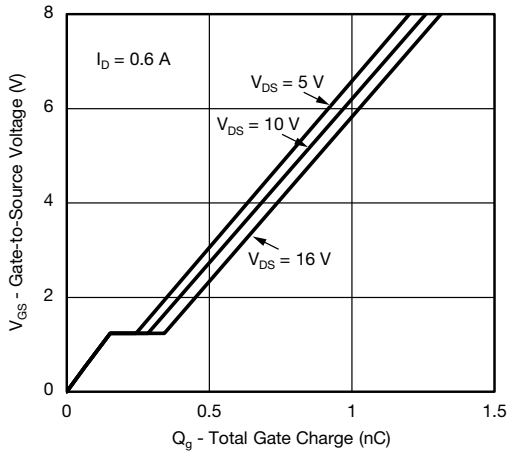
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

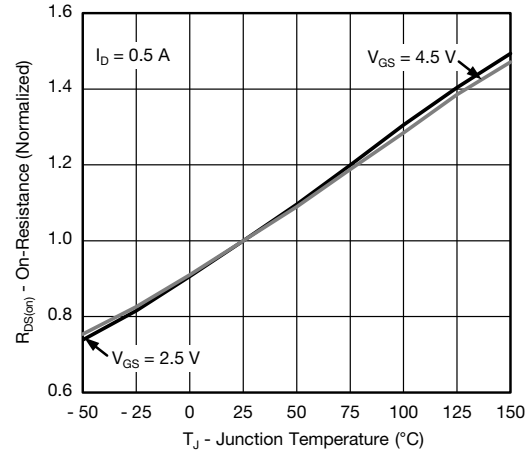
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25 °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

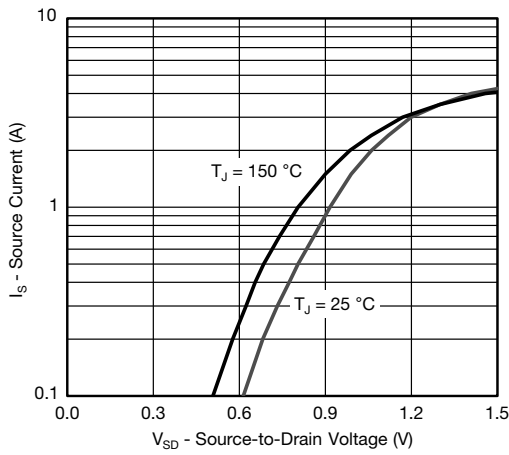
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



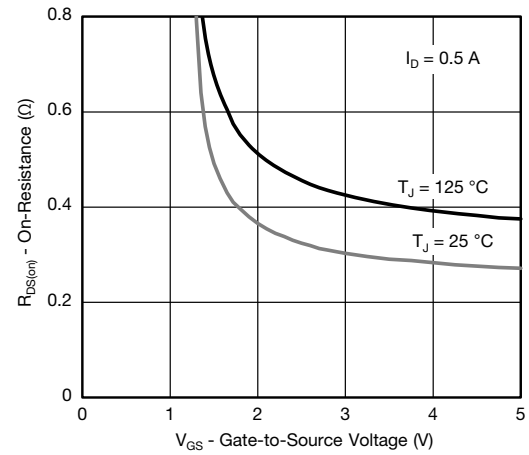
Gate Charge



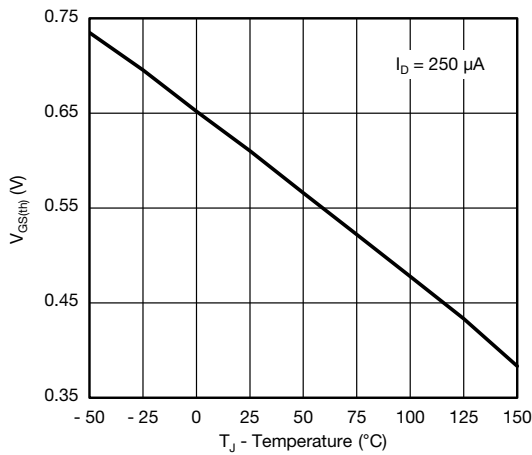
On-Resistance vs. Junction Temperature



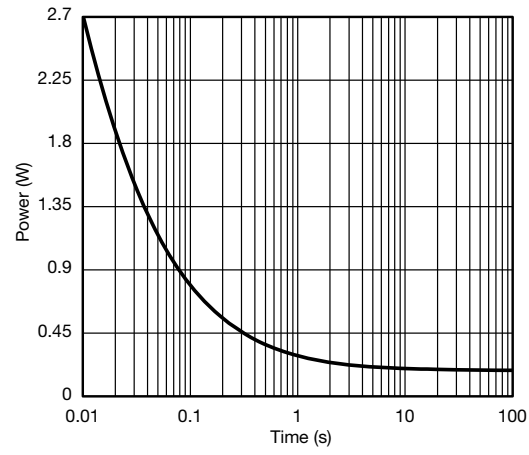
Source-Drain Diode Forward Voltage



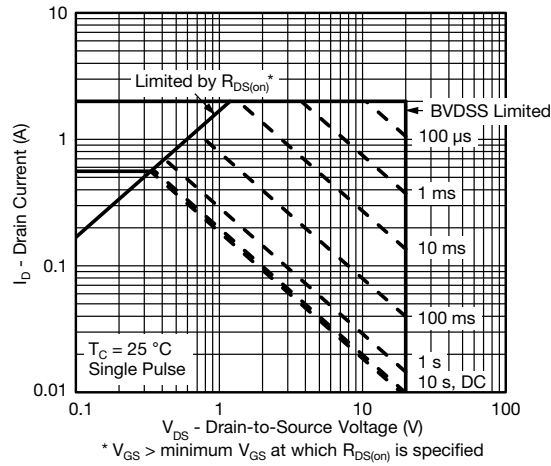
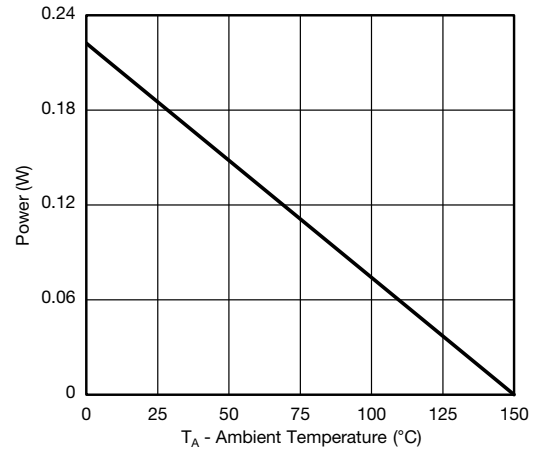
On-Resistance vs. Gate-to-Source Voltage



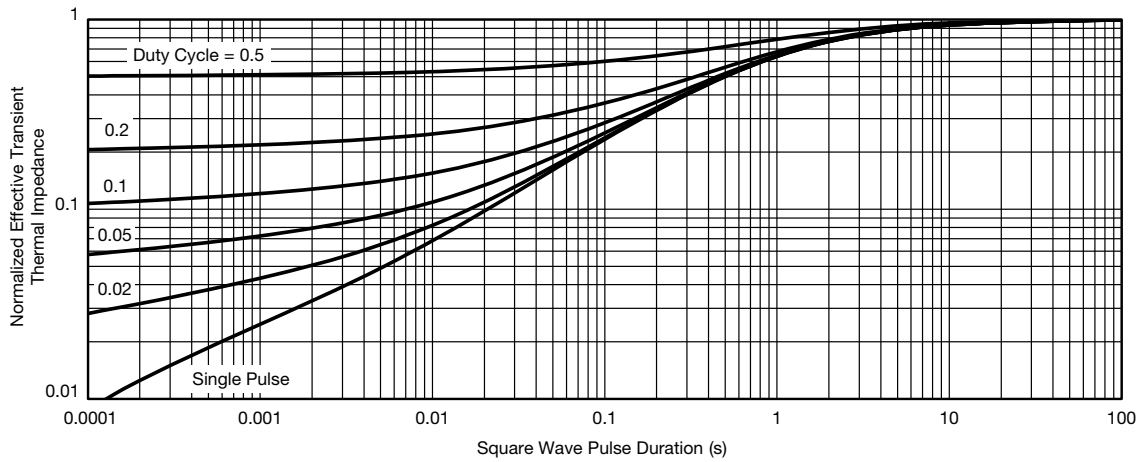
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Safe Operating Area, Junction-to-Ambient

Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.


Normalized Thermal Transient Impedance, Junction-to-Ambient

Technical drawing of a mechanical part, likely a bracket or support, showing multiple views and details.

Main View (Top): Shows the front view of the part. Dimensions include overall width D , overall height E , and various offsets and radii. Section lines indicate cross-sections 2, 3, 4, 5, and 6. A detail callout "DETAIL 'A'" is shown.

Section B-B (Right): A cross-section view showing the internal profile of the part, with dimensions B and C . Section line 6 is indicated.

Detail 'A' (Bottom Right): A detailed view of the corner of the part, showing the transition between the vertical and horizontal surfaces. Section line A1 is indicated.

Other Views:

- Top View (Bottom Left):** Shows the top surface of the part, with dimensions L and $L1$.
- Side View (Bottom):** Shows the side profile of the part, with dimension A .

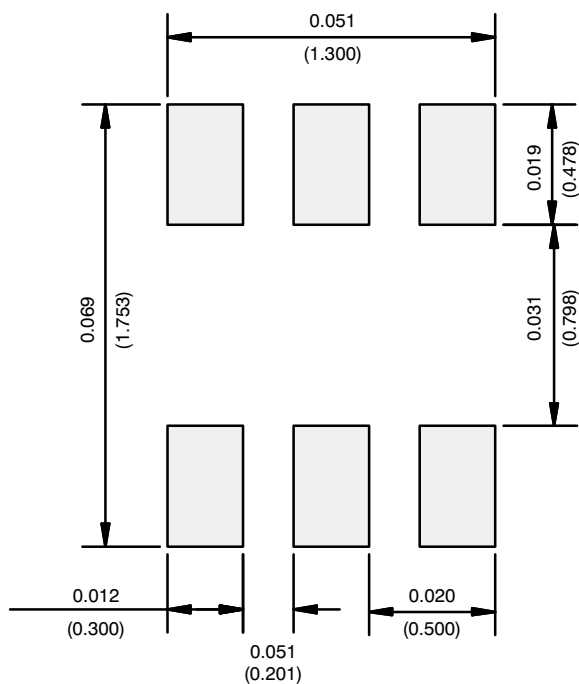
Annotations and Symbols:

- $2x$, $4x$, $6x$, $6x\ b$: Indicate the number of holes or features.
- ϕ : Symbol for a hole.
- aaa , bbb , ddd : Labels for specific features or materials.
- A-B , C , D : Section line labels.
- E1/2 , E/2 : Dimension labels for specific offsets.
- e1 , e : Dimension labels for specific offsets.

1. Dimensions in millimeters.

- | DIM. | MILLIMETERS | | |
|------|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.56 | 0.58 | 0.60 |
| A1 | 0 | 0.02 | 0.10 |
| b | 0.15 | 0.22 | 0.30 |
| c | 0.10 | 0.14 | 0.18 |
| D | 1.50 | 1.60 | 1.70 |
| E | 1.50 | 1.60 | 1.70 |
| E1 | 1.15 | 1.20 | 1.25 |
| e | 0.45 | 0.50 | 0.55 |
| e1 | 0.95 | 1.00 | 1.05 |
| L | 0.25 | 0.35 | 0.50 |
| L1 | 0.10 | 0.20 | 0.30 |

RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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