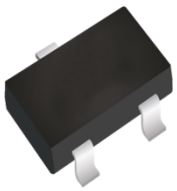
2N7002KM

60V N-Channel Enhancement Mode Power MOSFET

PRIMARY CHARACTERISTICS		
BV_{DSS}	$R_{DS(ON)}$MAX	I_D
60V	2.0Ω @VGS=10V	0.33
	2.4Ω @VGS=4.5V	

SOT-23



Features

- 60V N-Channel Enhancement Mode MOSFET
- RDS(on) < 2.0Ω @ VGS=10V
- RDS(on) < 2.4Ω @ VGS=4.5V
- High density cell design for low RDS(on)
- Voltage controlled small signal switch
- High saturation current capability
- ESD protected up to 2.0KV (HBM)
- RoHS compliant

Mechanical Data

- Package: SOT-23
- Green molding compound
- UL flammability classification 94V-0
- Lead finish: matte tin
- Marking: 7002

Applications

- Load switch for portable devices
- DC/DC converter
- Power management
- Small signal switching

Ordering Information

Orderable Part Number	Package Type	Device Marking	Form	Quantity (pcs)
2N7002KM	SOT-23	7002	7" Tape&Reel	3,000

Maximum Ratings (@ T_A = 25°C, unless otherwise specified.)

Parameter		Symbol	Value	Unit
Drain - Source Voltage		V_{DS}	60	V
Gate - Source Voltage		V_{GS}	±20	V
Continuous Drain Current (V_{GS} = 4.5V) (1)	T_A = 25°C	I_D	0.33	A
	T_A = 70°C		0.26	A
Pulsed Drain Current (2)		I_{DM}	1.3	A
Power Dissipation	T_A = 25°C	P_D	0.48	W
	T_A = 70°C		0.31	W
Junction & Storage Temperature Range		T_J, T_{STG}	-55 ~ +150	°C

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient (3)	$R_{\theta JA}$	200	260	°C/W

Electrical Characteristics (@ T_J = 25°C, unless otherwise specified.)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics (4)						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	VGS=0V, ID=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	VDS=60V, VGS = 0V,TJ=25℃	-	-	1.0	μA
		VDS=60V, VGS = 0V, TJ=125℃	-	-	100	μA
Gate-Source Leakage Current	I_{GSS}	VGS=±20V, VDS = 0V	-	-	10	μA
On Characteristics (4)						
Gate Threshold Voltage	$V_{GS(th)}$	VDS=VGS, ID=250μA	1.0	1.6	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	VGS=4.5V, ID=0.2A	-	1.7	2.4	Ω
		VGS=10V, ID=0.3A	-	1.5	2.0	Ω
Forward Transconductance	g_{fs}	VDS=5.0V, ID=0.2A	-	0.335	-	S
Diodes Forward Voltage	V_{SD}	IS=115mA, VGS=0V	-	0.85	1.2	V
Dynamic Characteristics (4)						
Input Capacitance	C_{iss}	VDS=30V, VGS=0V, f=1MHz	-	19	-	pF
Output Capacitance	C_{oss}		-	7.2	-	pF
Reverse Transfer Capacitance	C_{rss}		-	3.3	-	pF
Gate Resistance	R_g	VGS=0V,VDS=0V, f=1MHz	-	412	-	Ω
Switching Characteristics (5)						
Turn-On DelayTime	$t_{d(on)}$	VGS=10V, VDS=30V, ID=0.3A, RGEN=3.0Ω	-	2.8	-	ns
Rise Time	t_r		-	2.2	-	ns
Turn-Off DelayTime	$t_{d(off)}$		-	13	-	ns
Fall Time	t_f		-	5.4	-	ns
Gate Charge Characteristics (5)						
Total Gate Charge	Q_g	VDS=30V,ID=0.3A, VGS=10V	-	0.80	-	nC
Gate-Source Charge	Q_{gs}		-	0.12	-	nC
Gate-Drain Charge	Q_{gd}		-	0.19	-	nC
Gate Plateau Voltage	$V_{plateau}$		-	2.9	-	V
Drain-Source Diode Characteristics(5)						
Diode Forward Current	I_S	TA = 25°C	-	-	0.33	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}	TA = 25°C	-	-	-	A
Drain to Source Diode Forward Voltage	V_{SD}	VGS=0V	-	0.85	1.2	V

Notes:

1. This current is chip limited, which is calculated based on Rthja.
2. This current is calculated on single pulse with 10μs Single Pulse .
3. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
4. Short duration pulse test used to minimize self-heating effect.
5. Defined by design, not subject to production.

Typical Electrical and Thermal Characteristics

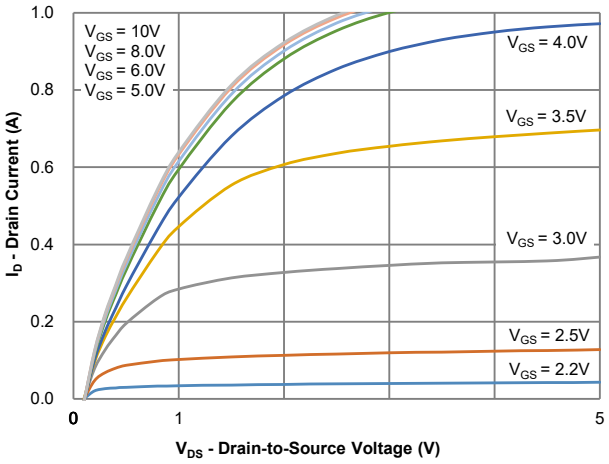


Figure 1: Output Characteristics

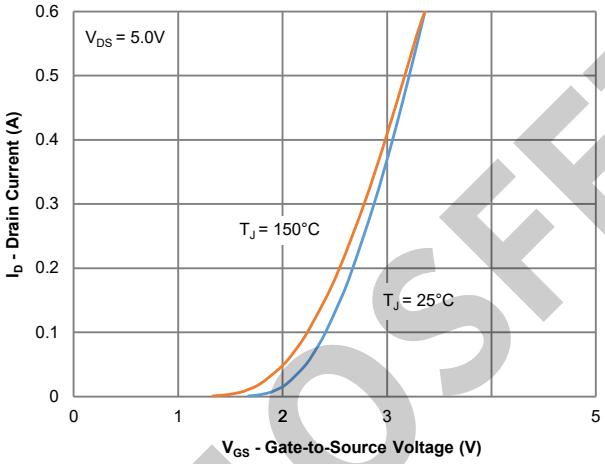


Figure 2: Transfer Characteristics

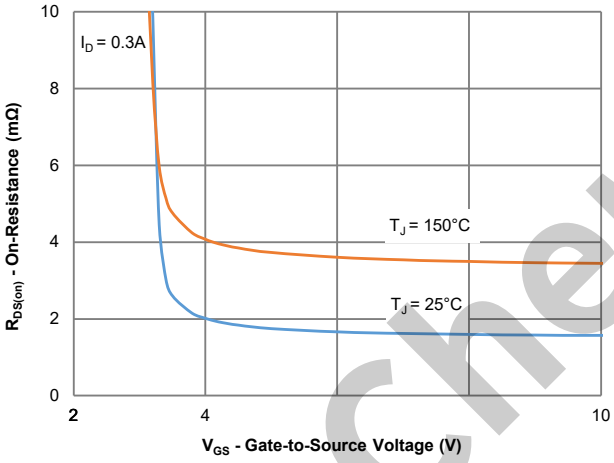


Figure 3: On-Resistance vs. Gate-Source Voltage

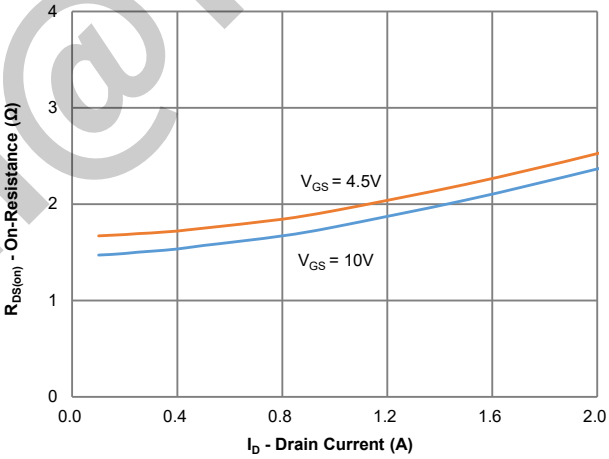


Figure 4: On-Resistance vs. Gate-Source Voltage

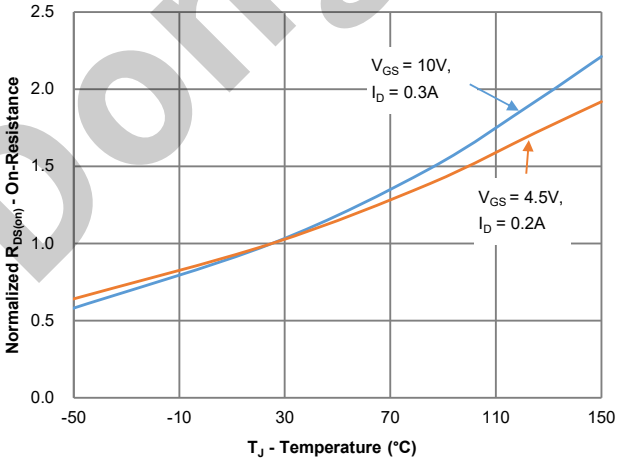


Figure 5: On-Resistance vs. Junction Temperature

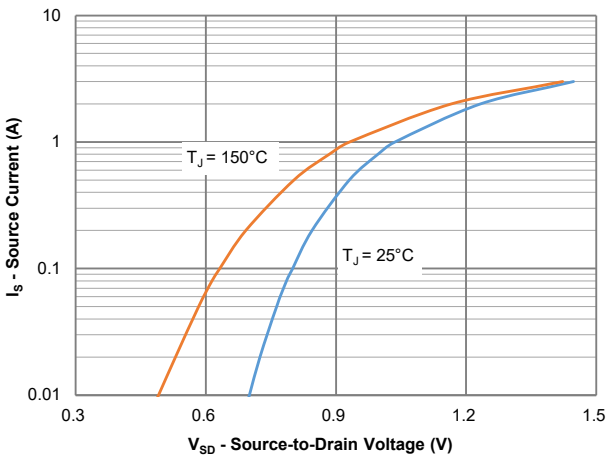


Figure 6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics

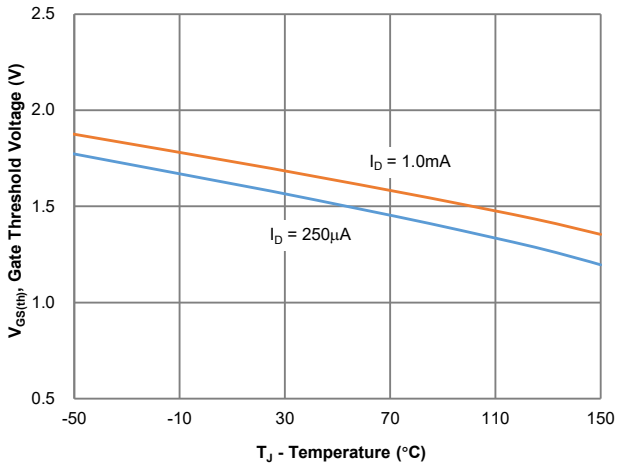


Figure 7: Gate Threshold Variation vs. Junction Temperature

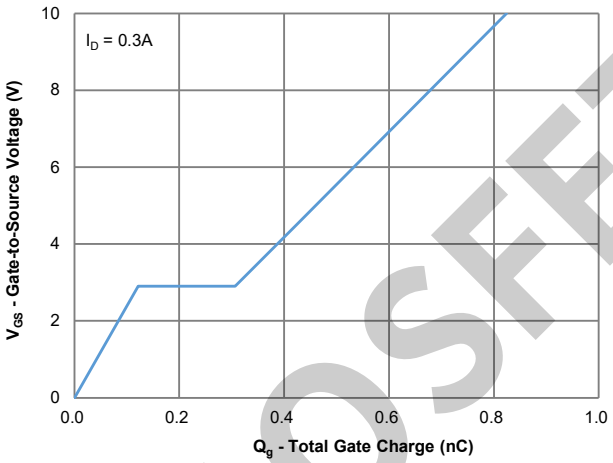


Figure 8: Gate Charge Characteristics

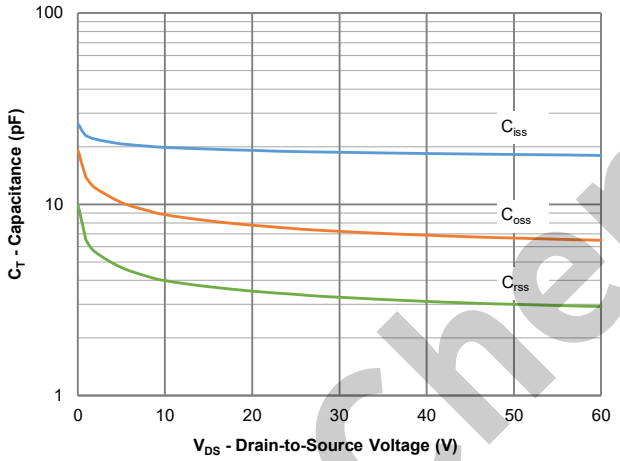


Figure 9: Capacitance Characteristics

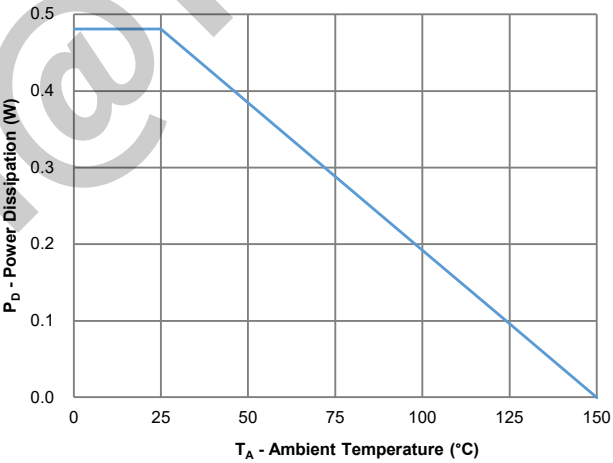


Figure 10: Power Derating

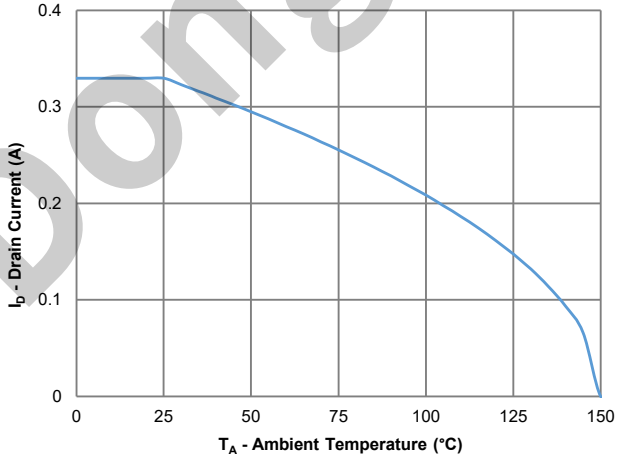


Figure 11: Current Derating

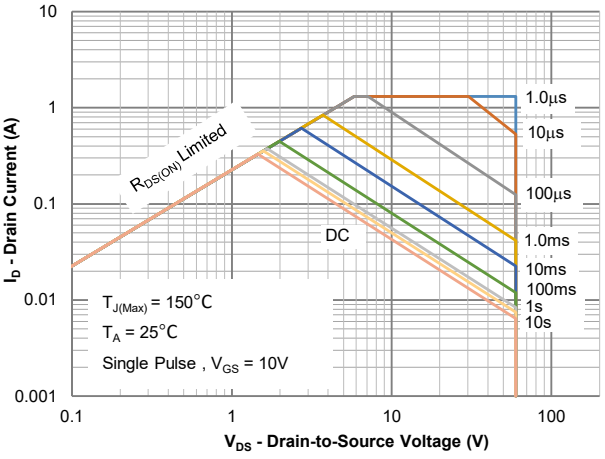


Figure 12: Safe Operating Area

Typical Electrical and Thermal Characteristics

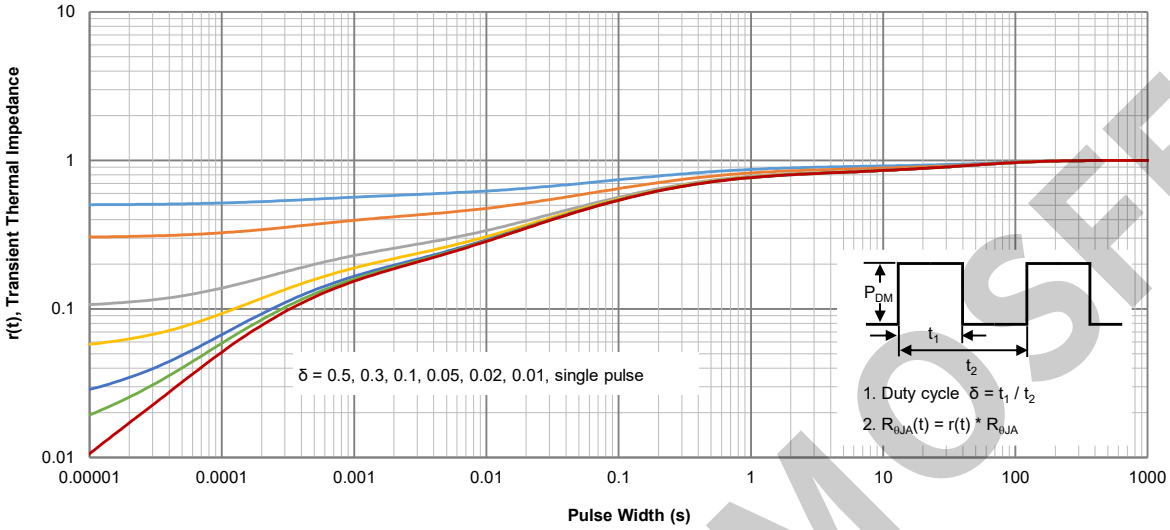


Figure 13: Normalized Maximum Transient Thermal Impedance

Outline Drawing

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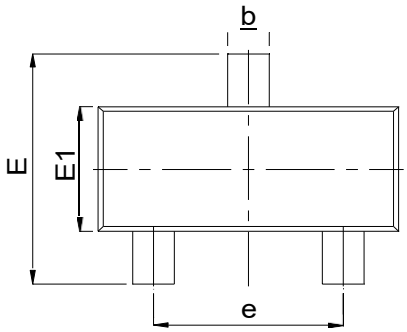
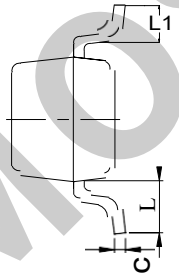
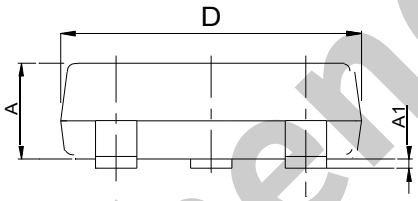


Top View



Side View



Front View

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	-	0.10
D	2.80	2.90	3.00
E	2.30	2.40	2.50
E1	1.20	1.30	1.40
L	0.45	0.55	0.65
L1	0.20	-	0.55
b	0.30	0.40	0.50
c	-	0.10	0.15
e	-	1.90	-

Dimensions in inches and (millimeters)

Suggested Soldering Pad Layout

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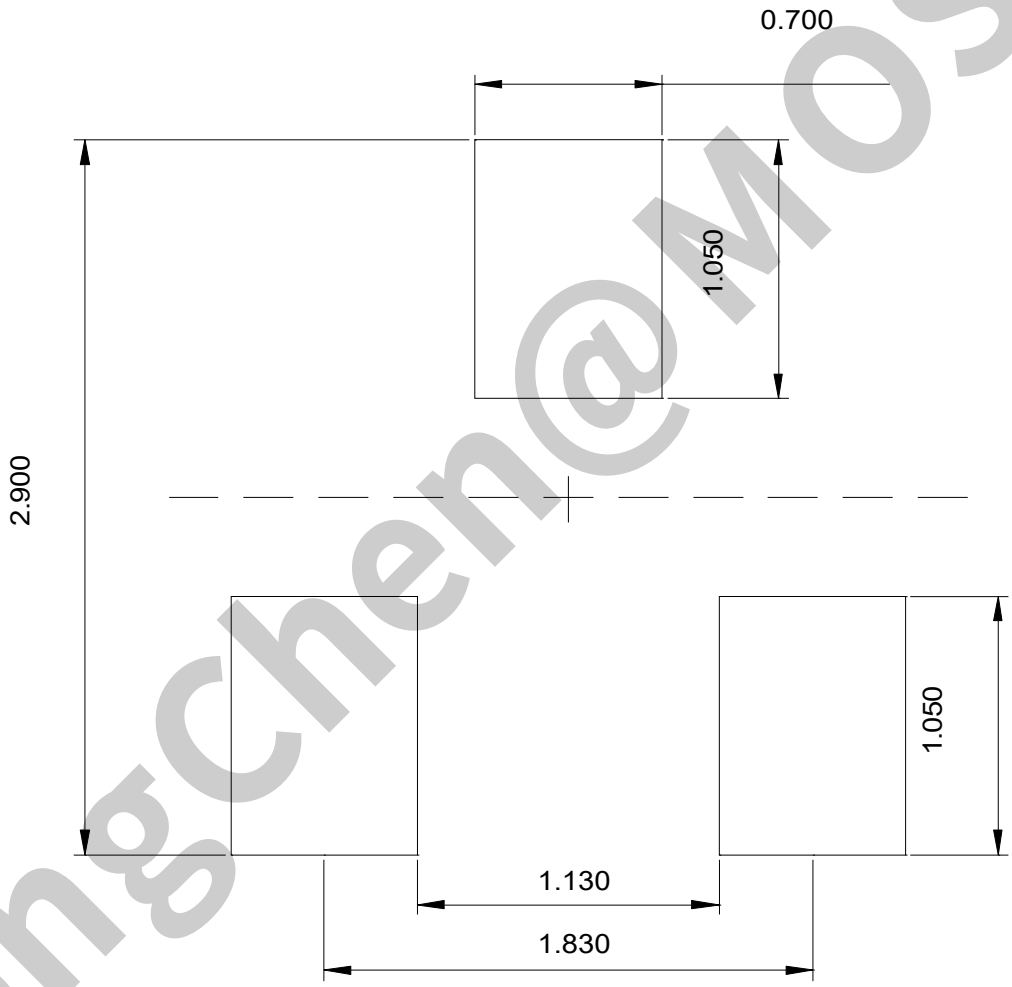

Dimensions in inches and (millimeters)

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