

60V N-Channel Enhancement Mode Power MOSFET

PRIMARY CHARACTERISTICS

BV _{DSS}	R _{DS(ON)} MAX	I _D
60V	2.0 Ω @V _{GS} =10V	0.33
	2.4 Ω @V _{GS} =4.5V	

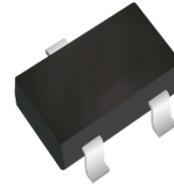
Features

- 60V N-Channel Enhancement Mode MOSFET
- R_{DS(on)} < 2.0 Ω @ V_{GS}=10V
- R_{DS(on)} < 2.4 Ω @ V_{GS}=4.5V
- High density cell design for low R_{DS(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

SOT-23



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)
DC2N7002KM	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	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	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 _{θJA}	200	260	°C/W

Electrical Characteristics (@ $T_J = 25^\circ\text{C}$, 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	IDSS	VDS=60V, VGS = 0V, TJ=25°C	-	-	1.0	μA
		VDS=60V, VGS = 0V, TJ=125°C	-	-	100	μA
Gate-Source Leakage Current	IGSS	VGS=±20V, VDS = 0V	-	-	10	μA
On Characteristics ⁽⁴⁾						
Gate Threshold Voltage	VGS(th)	VDS=VGS, ID=250μA	1.0	1.6	2.5	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=4.5V, ID=0.2A	-	1.7	2.4	Ω
		VGS=10V, ID=0.3A	-	1.5	2.0	Ω
Forward Transconductance	gfs	VDS=5.0V, ID=0.2A	-	0.335	-	S
Diodes Forward Voltage	VSD	IS=115mA, VGS=0V	-	0.85	1.2	V
Dynamic Characteristics ⁽⁴⁾						
Input Capacitance	Ciss	VDS=30V, VGS=0V, f=1MHz	-	19	-	pF
Output Capacitance	Coss		-	7.2	-	pF
Reverse Transfer Capacitance	Crss		-	3.3	-	pF
Gate Resistance	Rg	VGS=0V,VDS=0V, f=1MHz	-	412	-	Ω
Switching Characteristics ⁽⁵⁾						
Turn-On DelayTime	td(on)	VGS=10V, VDS=30V, ID=0.3A, RGEN=3.0Ω	-	2.8	-	ns
Rise Time	tr		-	2.2	-	ns
Turn-Off DelayTime	td(off)		-	13	-	ns
Fall Time	tf		-	5.4	-	ns
Gate Charge Characteristics ⁽⁵⁾						
Total Gate Charge	Qg	VDS=30V,ID=0.3A, VGS=10V	-	0.80	-	nC
Gate-Source Charge	Qgs		-	0.12	-	nC
Gate-Drain Charge	Qgd		-	0.19	-	nC
Gate Plateau Voltage	Vplateau		-	2.9	-	V
Drain-Source Diode Characteristics ⁽⁵⁾						
Diode Forward Current	IS	TA = 25°C	-	-	0.33	A
Maximum Pulsed Drain to Source Diode Forward Current	ISM	TA = 25°C	-	-	-	A
Drain to Source Diode Forward Voltage	VSD	VGS=0V	-	0.85	1.2	V

Notes:

1. This current is chip limited, which is calculated based on R_{thja} .
2. This current is calculated on single pulse with 10 μs 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

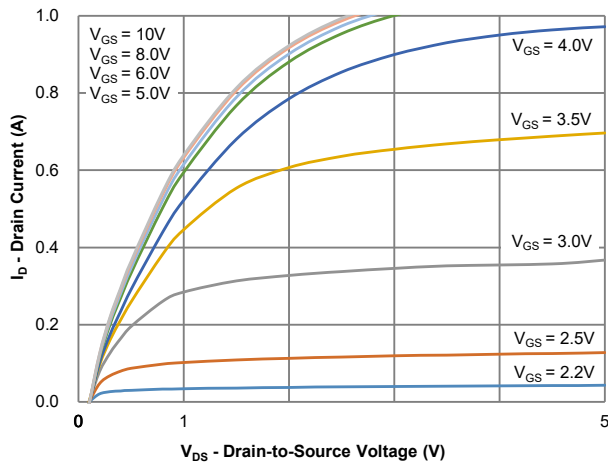


Figure 1: Output Characteristics

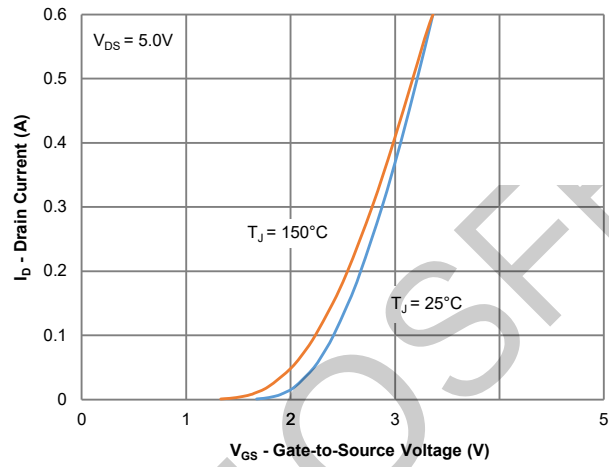


Figure 2: Transfer Characteristics

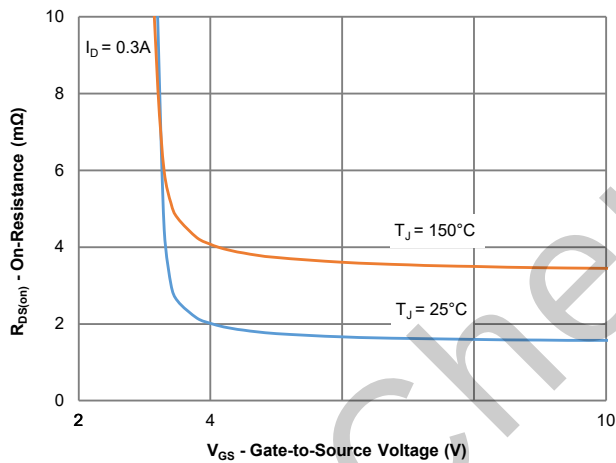


Figure 3: On-Resistance vs. Gate-Source Voltage

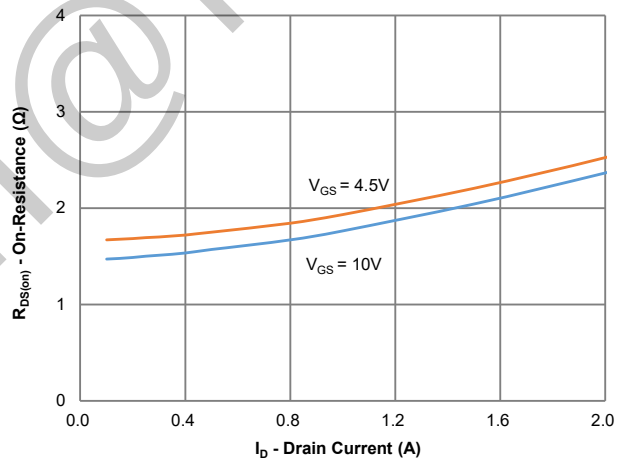


Figure 4: On-Resistance vs. Drain Current

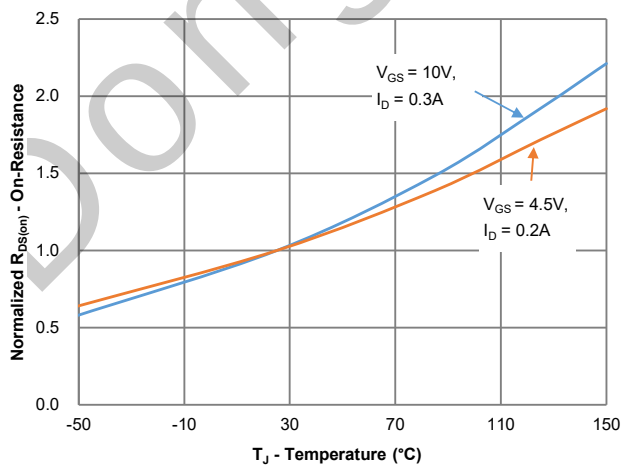


Figure 5: On-Resistance vs. Junction Temperature

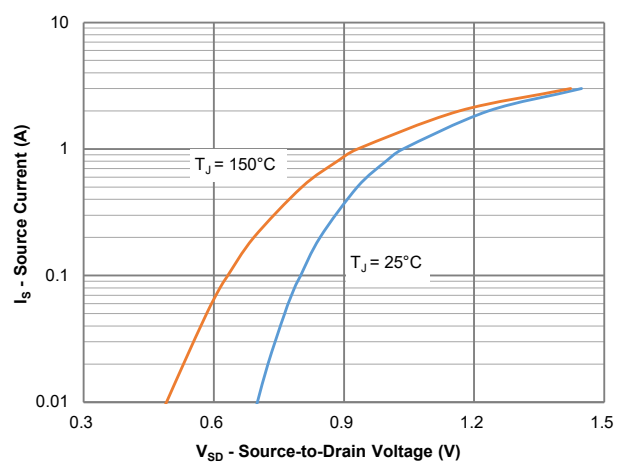


Figure 6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics

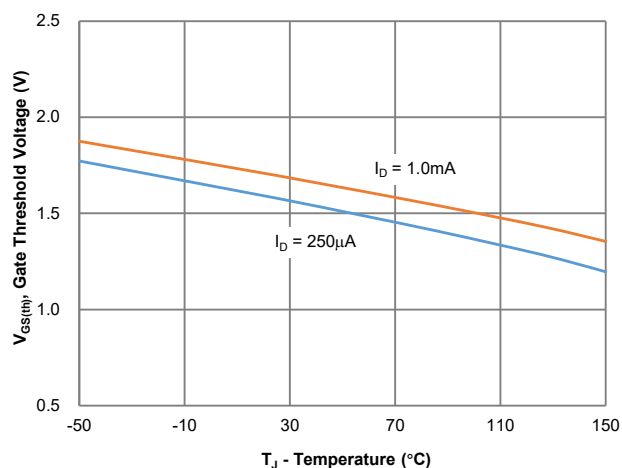


Figure 7: Gate Threshold Variation vs. Junction Temperature

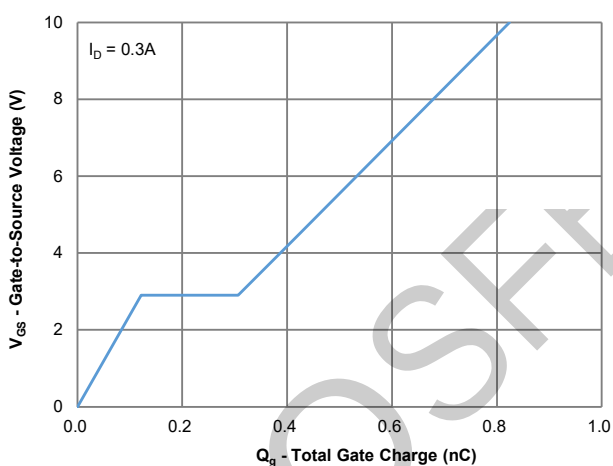


Figure 8: Gate Charge Characteristics

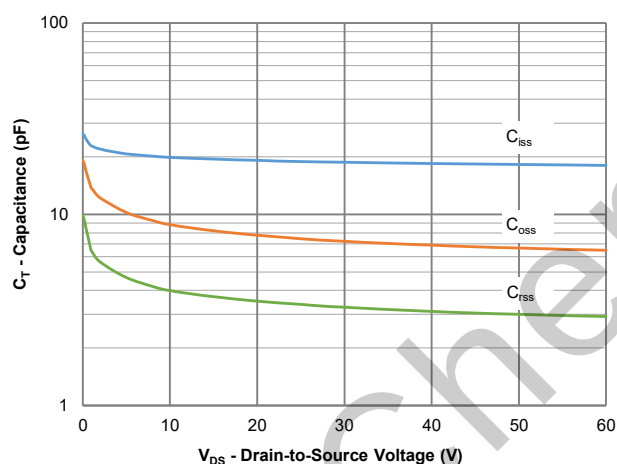


Figure 9: Capacitance Characteristics

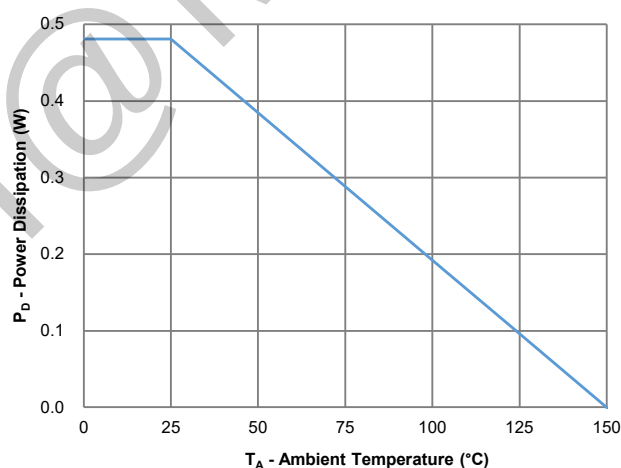


Figure 10: Power Derating

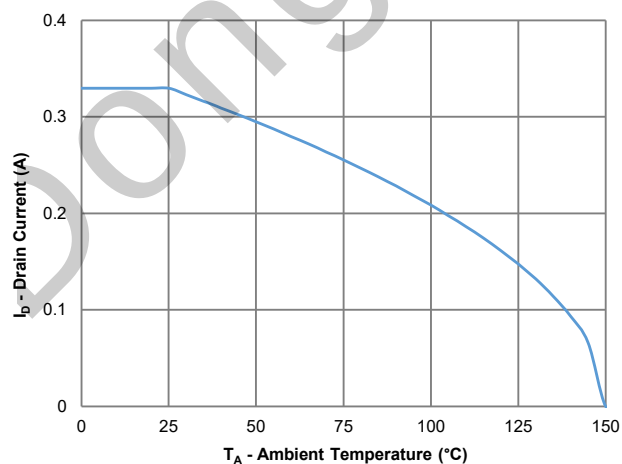


Figure 11: Current Derating

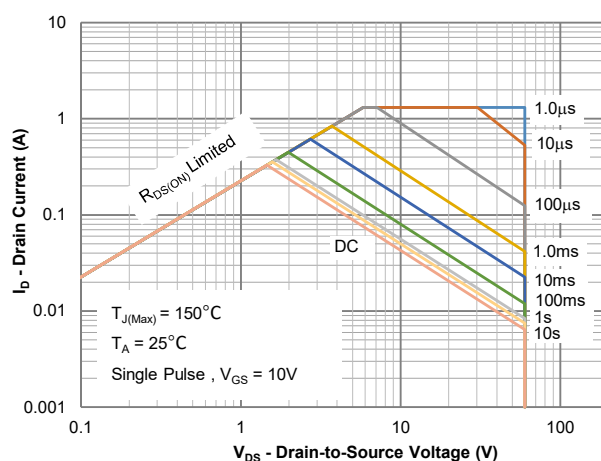


Figure 12: Safe Operating Area

Typical Electrical and Thermal Characteristics

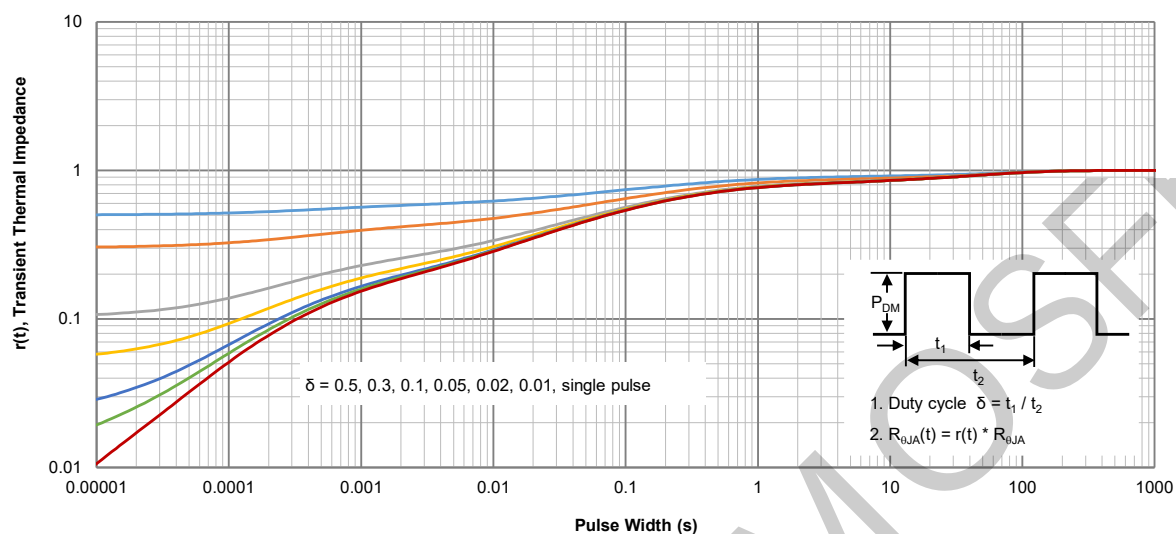
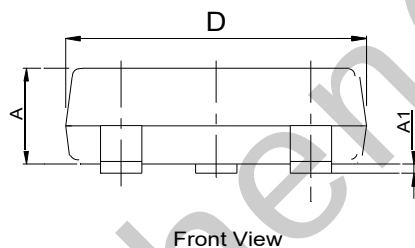
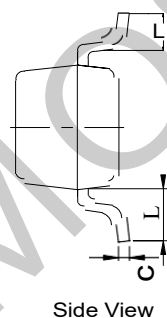
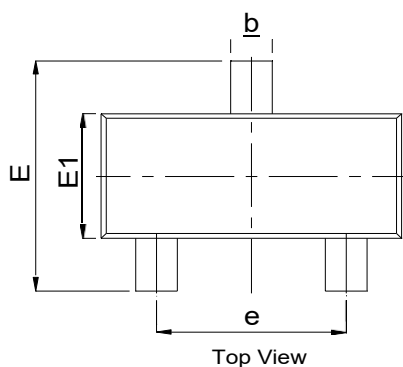


Figure 13: Normalized Maximum Transient Thermal Impedance

Outline Drawing

SOT-23

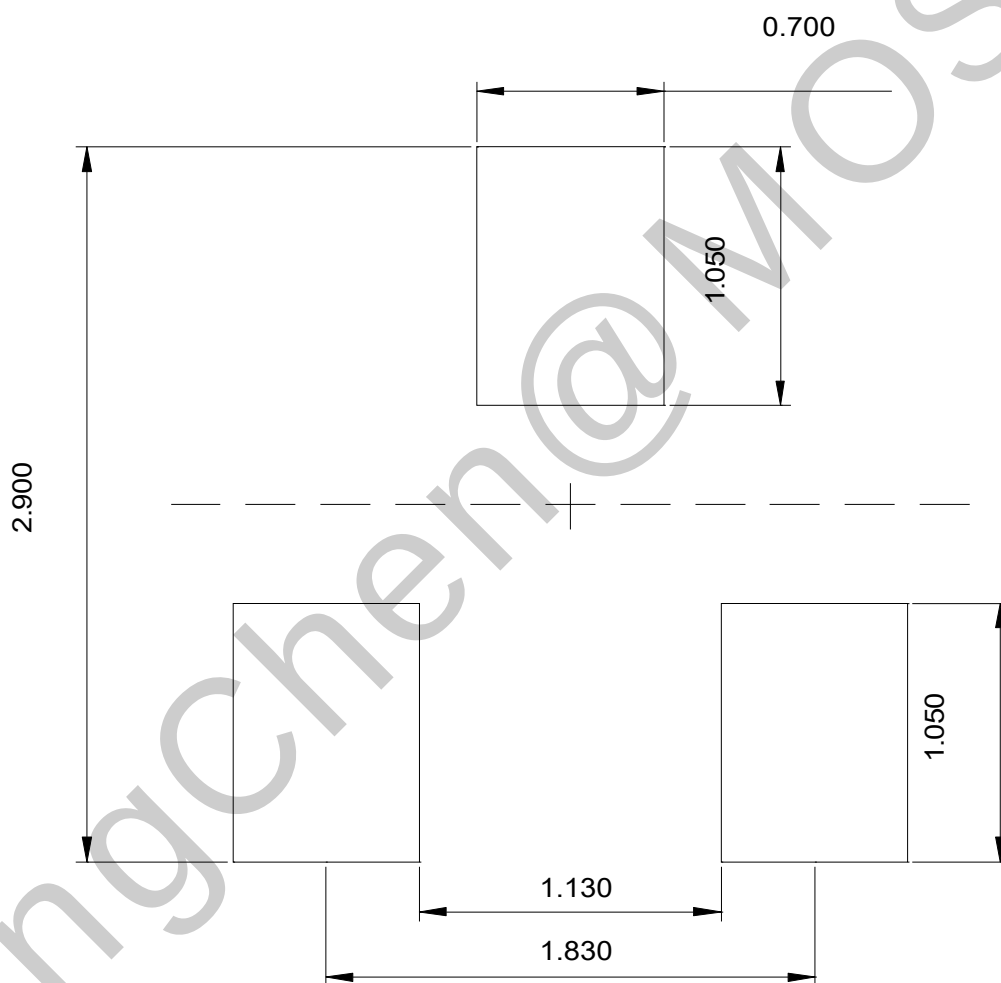


DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	-	0.10
D	2.80	2.90	3.00
E	2.30	2.40	2.50
E1	1.20	1.30	1.40
L	0.45	0.55	0.65
L1	0.20	-	0.55
b	0.30	0.40	0.50
c	-	0.10	0.15
e	-	1.90	-

Dimensions in inches and (millimeters)

Suggested Soldering Pad Layout

SOT-23



Dimensions in inches and (millimeters)

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