

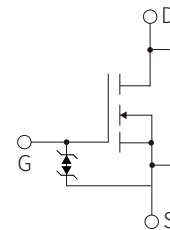
## FEATURES

- | High Density Cell Design For Low  $R_{DS(On)}$
- | Voltage Controlled Small Signal Switch
- | Rugged and Reliable
- | High Saturation Current Capability
- | Lead free product is acquired



## APPLICATION

- | Direct logic-level interface: TTL/CMOS
- | Drivers: relays, solenoids, lamps
- | hammers, display, memories, etc.
- | Battery operated systems
- | Solid-state relays



## APPROVALS

<b>RoHS</b>	Compliance with 2011/65/EU
<b>HF</b>	Compliance with IEC61249-2-21:2003

## ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ )

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current	$I_D^*$	0.5	A
Pulsed Drain Current	$I_{DM}^{**}$	2	A
Total Power Dissipation	$P_{tot}^*$	0.83	W
Diode Forward Current	$I_S^*$	0.5	A
Thermal Resistance- Junction to Ambient	$R_{\theta JA}^*$	150	$^{\circ}\text{C}/\text{W}$
Junction Temperature	$T_J$	150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-55 to 150	$^{\circ}\text{C}$

Notes:

\* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10$  sec

\*\* Pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	60			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1	1.5	2	V
Drain Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V			1	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V		±0.8		μA
Drain-source on-resistance	R <sub>DS(on)</sub> <sup>a</sup>	V <sub>GS</sub> =10V, I <sub>DS</sub> =0.5A		1.5	2	Ω
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =0.2A		2	2.7	
<b>Diode Characteristics</b>						
Diode Forward Voltage	V <sub>SD</sub> <sup>a</sup>	I <sub>SD</sub> =0.5A, V <sub>GS</sub> =0V		0.85		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>SD</sub> =0.5A, dI <sub>SD</sub> /dt=100A/μs		30		ns
Reverse Recovery Charge	Q <sub>rr</sub>			29		nC
<b>Diode Characteristics<sup>b</sup></b>						
Gate Resistance	R <sub>G</sub>	V <sub>GS</sub> =V <sub>DS</sub> =0V, F=1MHz		200		Ω
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, Frequency = 1MHz		14.7		pF
Output capacitance	C <sub>oss</sub>			0.76		
Reverse transfer capacitance	C <sub>rss</sub>			0.63		
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =30V, V <sub>GEN</sub> =10V R <sub>G</sub> =25Ω, R <sub>L</sub> =60Ω, I <sub>DS</sub> =0.5A		2.7		nS
Turn-on Rise Time	t <sub>r</sub>			2.5		
Turn-Off Delay Time	t <sub>d(off)</sub>			13		
Turn-Off Fall Time	t <sub>f</sub>			8		
<b>Gate Charge Characteristics<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>DS</sub> =0.5A		0.44		nC
Gate-Source Charge	Q <sub>gs</sub>			0.2		
Gate-Drain Charge	Q <sub>gd</sub>			0.1		

Notes:

a : Pulse test ; pulse width ≤ 300us, duty cycle ≤ 2 %

b : Guaranteed by design, not subject to production testing

# PARAMETER CHARACTERISTIC CURVE

Figure1: Power Capability

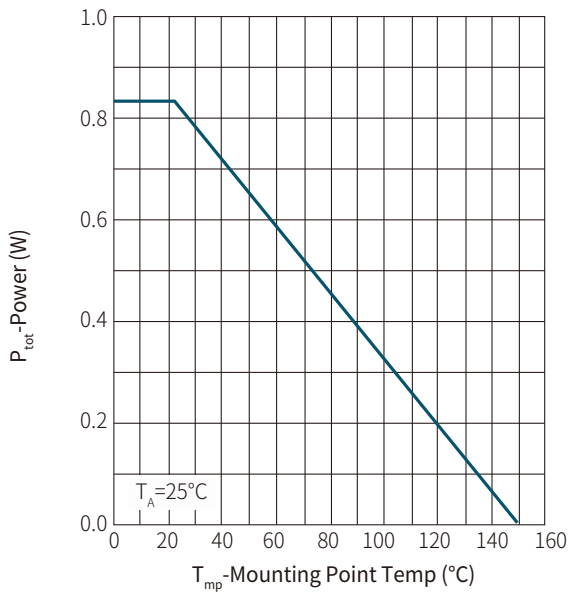


Figure2: Current Capability

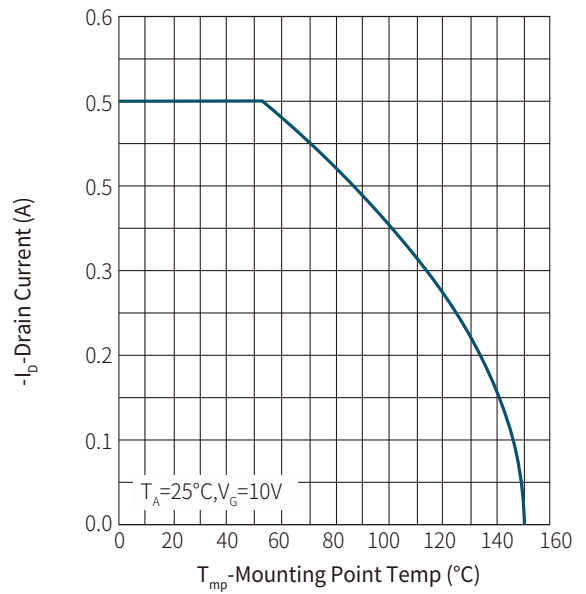


Figure3: Safe Operation Area

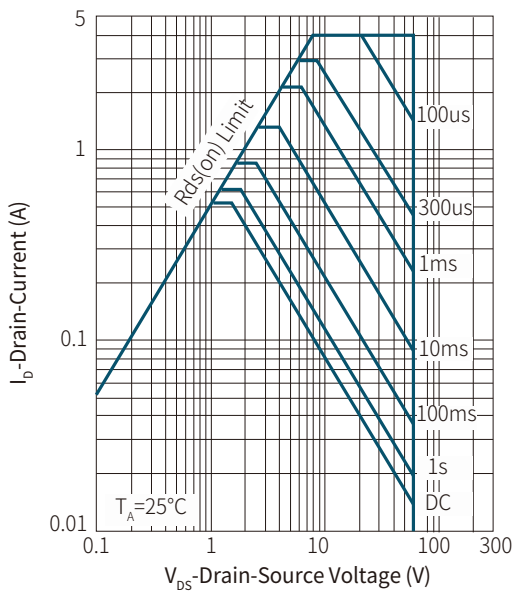


Figure 4: Transient Thermal Impedance

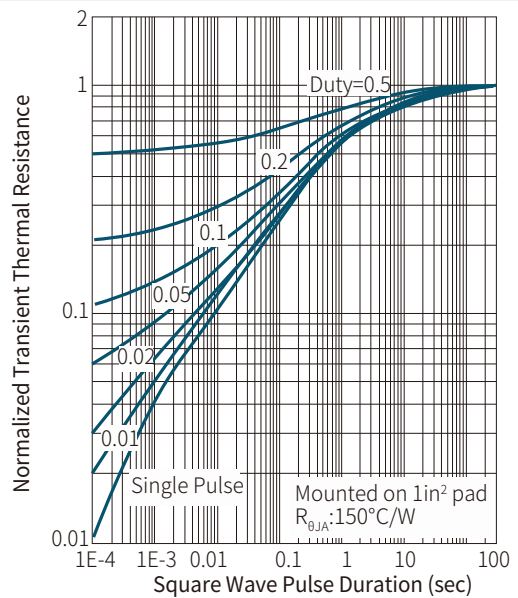


Figure 5: Output Characteristics

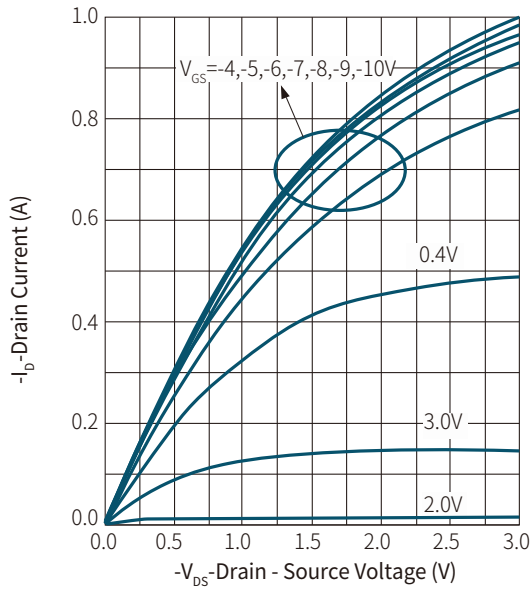


Figure 6: On Resistance

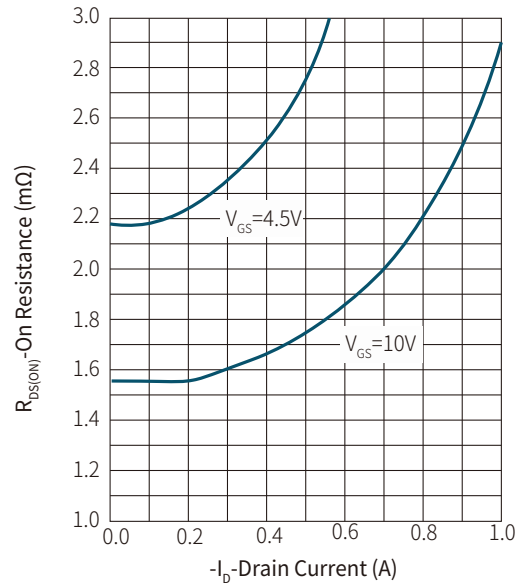


Figure 7: Transfer Characteristics

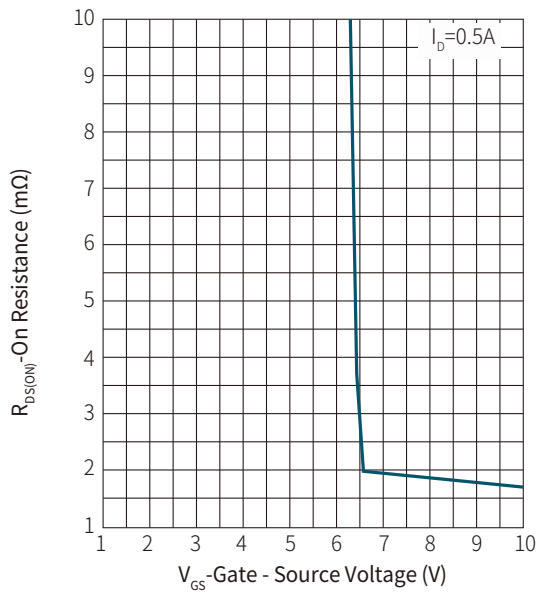
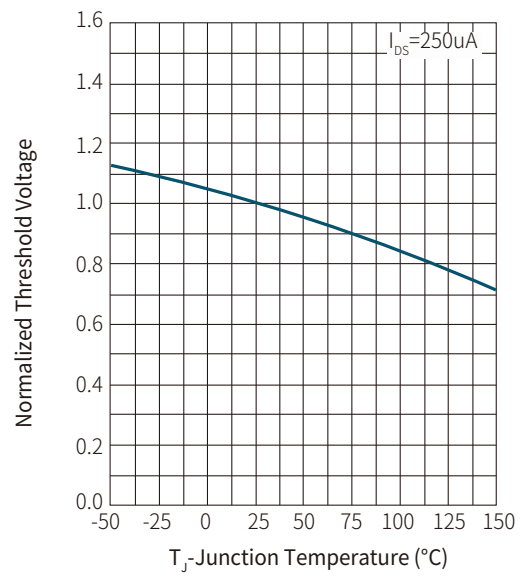
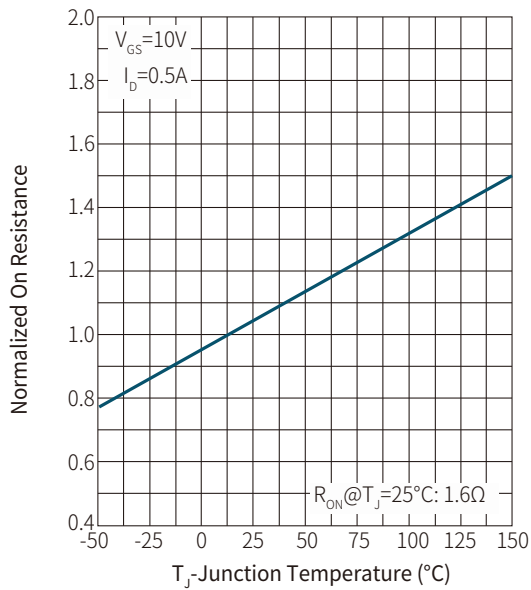
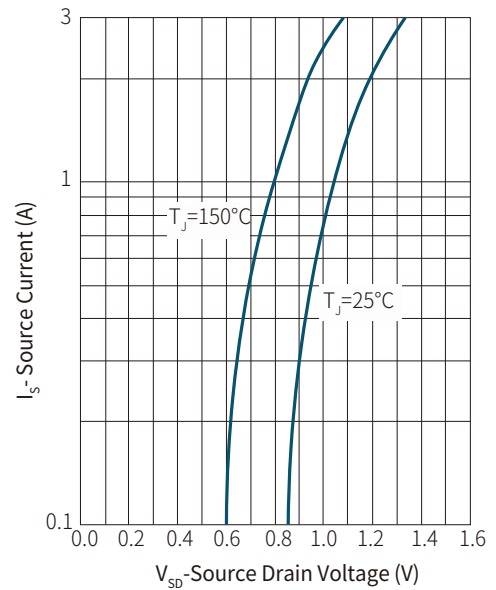
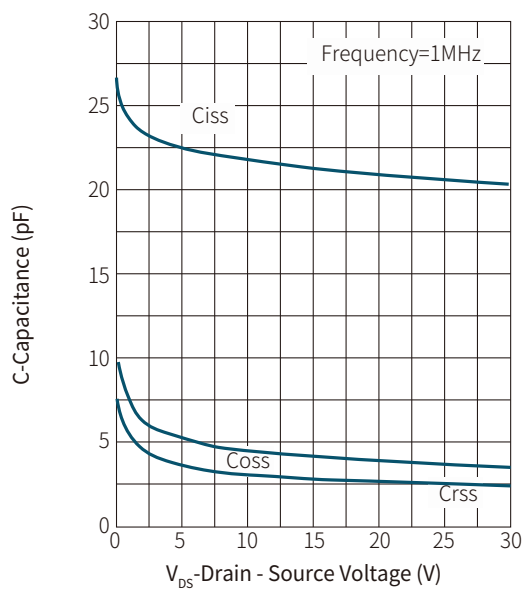
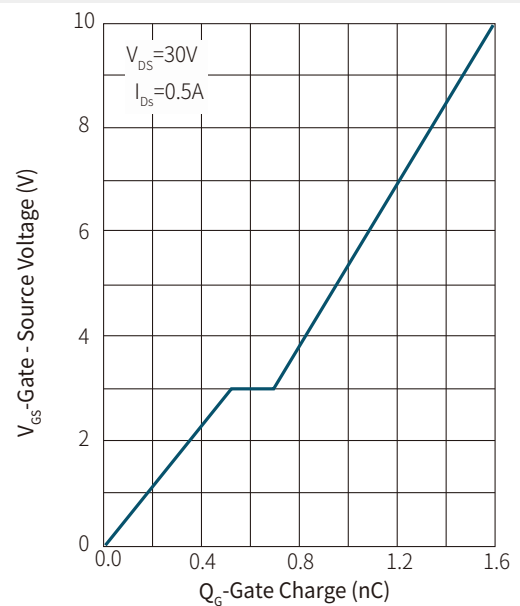
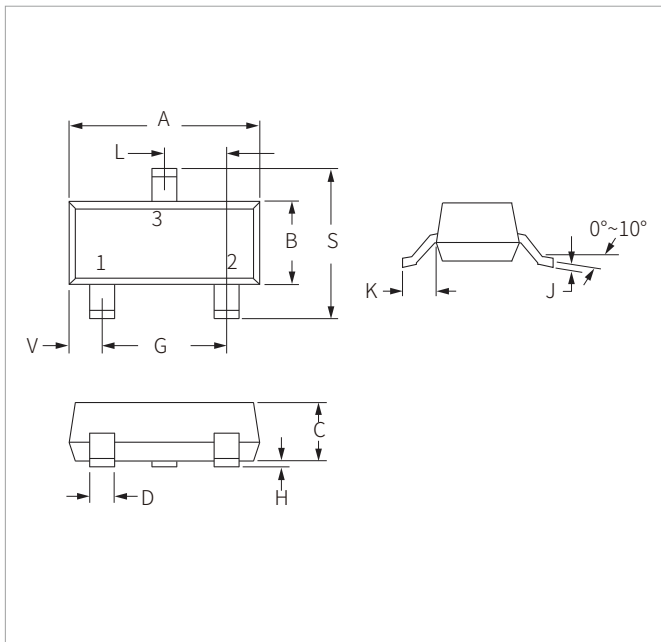


Figure 8: Normalized Threshold Voltage



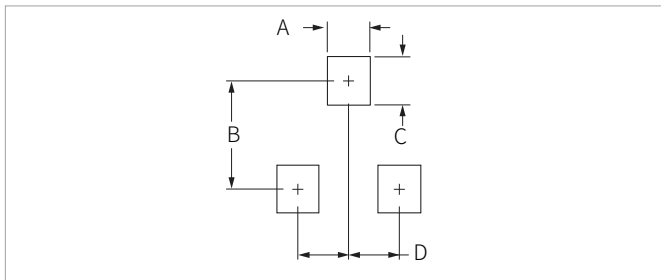
**Figure 9: Normalized On Resistance**

**Figure 10: Diode Forward Current**

**Figure 11: Capacitance**

**Figure 12: Gate Charge**


## SOT-23 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.80	3.05	0.110	0.120
B	1.20	1.40	0.047	0.055
C	0.90	1.15	0.035	0.045
D	0.37	0.50	0.015	0.020
G	1.75	2.05	0.069	0.081
H	0.01	0.100	0.001	0.004
J	0.085	0.180	0.003	0.007
K	0.35	0.69	0.014	0.029
L	0.89	1.02	0.035	0.040
S	2.10	2.65	0.083	0.104
V	0.45	0.60	0.018	0.024

## RECOMMENDED PAD LAYOUT DIMENSIONS



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.70	1.00	0.028	0.039
B	2.30	2.50	0.090	0.098
C	0.70	1.00	0.028	0.039
D	0.80	1.10	0.032	0.043

## ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
2N7002KE	SOT-23	3000PCS	7"

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