

## Features

- Operated at Low Logic Level Gate Drive
- P-Channel Switch with Low  $R_{DS(on)}$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

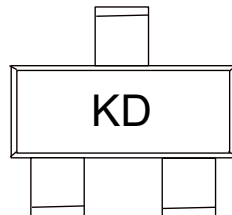
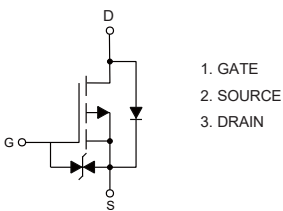
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 276°C/W Junction to Ambient(Steady-State)<sup>(2)</sup>

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	±12	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	-0.66
		$T_A=100^\circ\text{C}$	-0.42
Pulsed Drain Current <sup>(3)</sup>	$I_{DM}$	-2.7	A
Total Power Dissipation <sup>(4)</sup>	$P_D$	0.45	W

Note:

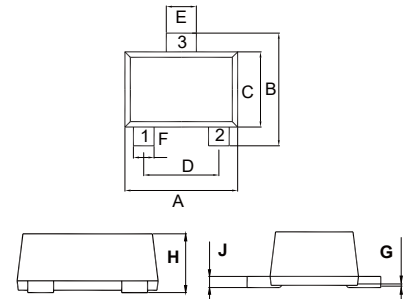
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The Power dissipation  $P_{DSM}$  is based on  $R_{\theta JA} t \leq 10\text{s}$  and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_D$  is based on max. junction temperature, using junction to ambient thermal resistance.

## Internal Structure and Marking Code



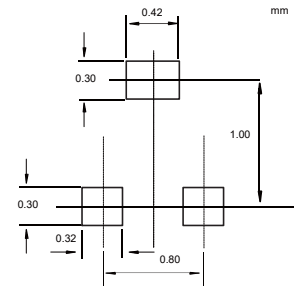
# P-CHANNEL MOSFET

## SOT-723



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.043	0.051	1.10	1.30	
B	0.043	0.051	1.10	1.30	
C	0.028	0.035	0.70	0.90	
D	0.031		0.80		TYP.
E	0.009	0.017	0.22	0.42	
F	0.005	0.013	0.12	0.32	
G	0.000	0.002	0.00	0.05	
H	0.017	0.021	0.43	0.54	
J	0.003	0.006	0.08	0.15	

### Suggested Solder Pad Layout



**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 10V$			$\pm 10$	$\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ C$			-1.0	
		$V_{DS}=-20V, V_{GS}=0V, T_J=125^\circ C$			-2.0	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.35		-0.8	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-1000mA$			0.52	$\Omega$
		$V_{GS}=-2.5V, I_D=-800mA$			0.70	
		$V_{GS}=-1.8V, I_D=-500mA$			0.95	
Gate Resistance	$R_g$	F=1 MHz, Open drain		82		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				-0.5	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-500mA$			-1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=-0.2A, dI_F/dt=100A/\mu s$		16		ns
Reverse Recovery Charge	$Q_{rr}$			3.5		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-16V, V_{GS}=0V, f=1MHz$		73.1		$\mu F$
Output Capacitance	$C_{oss}$			15		
Reverse Transfer Capacitance	$C_{rss}$			9		
Total Gate Charge	$Q_g$	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-1A$		1.5		nC
Gate-Source Charge	$Q_{gs}$			0.3		
Gate-Drain Charge	$Q_{gd}$			0.3		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=-10V, V_{GS}=-4.5V, R_{GEN}=10\Omega, I_D=-200mA$		9		ns
Turn-On Rise Time	$t_r$			5.8		
Turn-Off Delay Time	$t_{d(off)}$			32.7		
Turn-Off Fall Time	$t_f$			20.3		

Curve Characteristics

Fig. 1 - Typical Output Characteristics

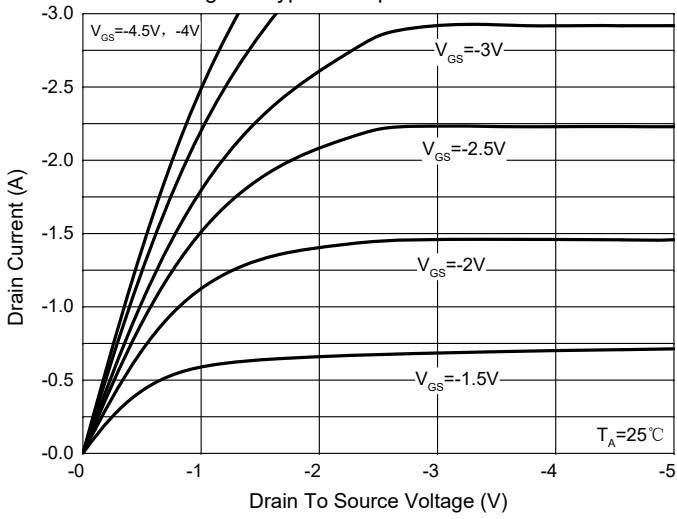


Fig. 2 - Transfer Characteristics

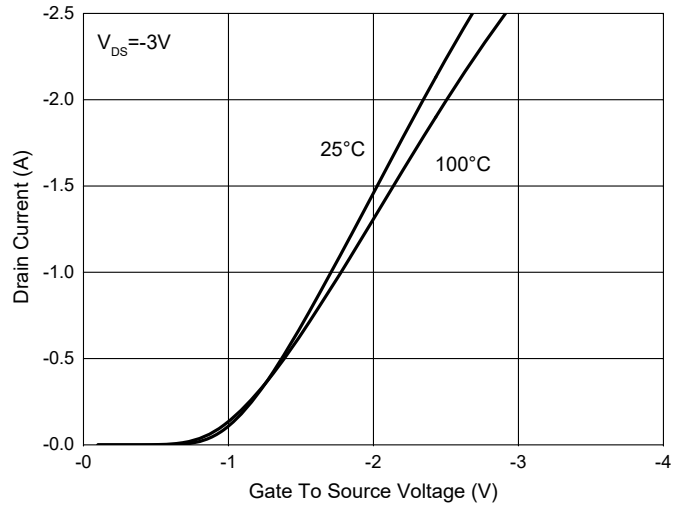


Fig. 3 -  $R_{DS(ON)} - I_D$

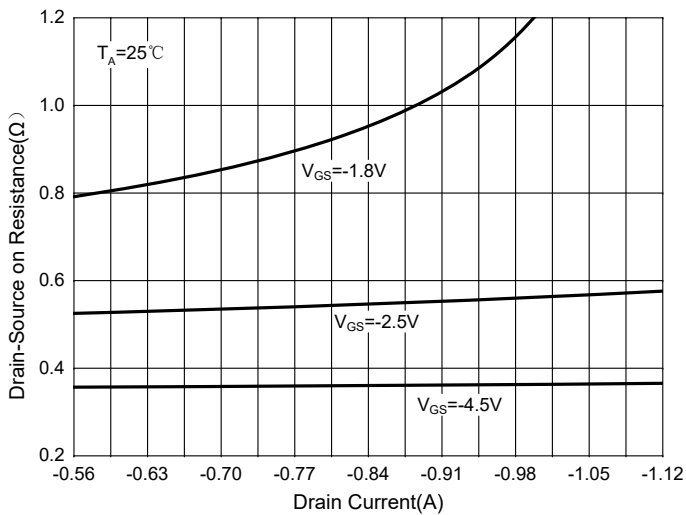


Fig. 4 -  $R_{DS(ON)} - V_{GS}$

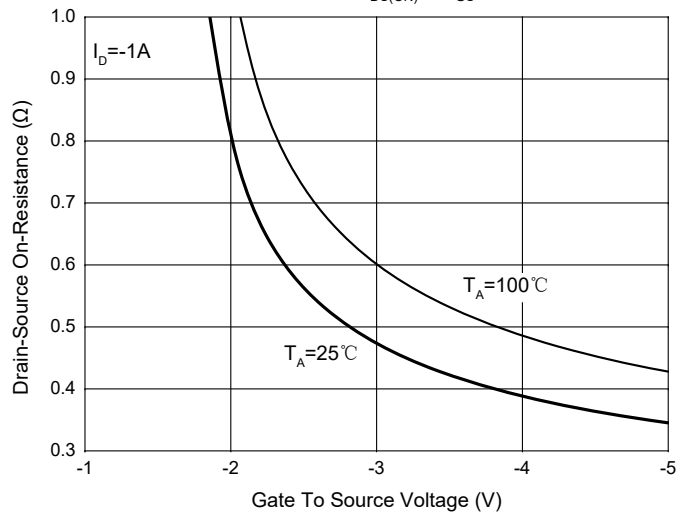


Fig. 5 -  $I_S - V_{SD}$

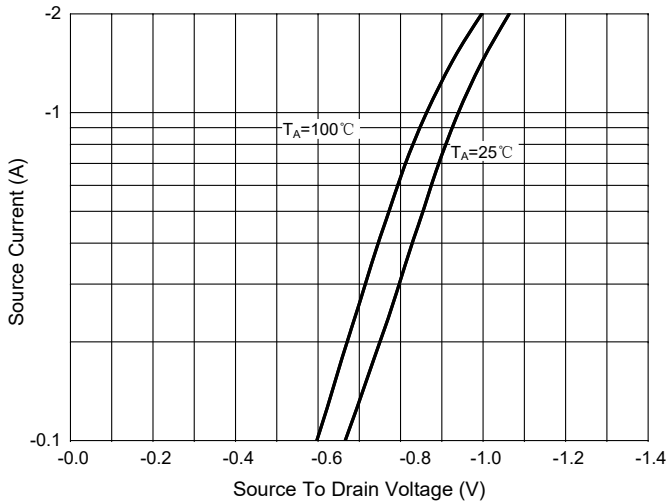
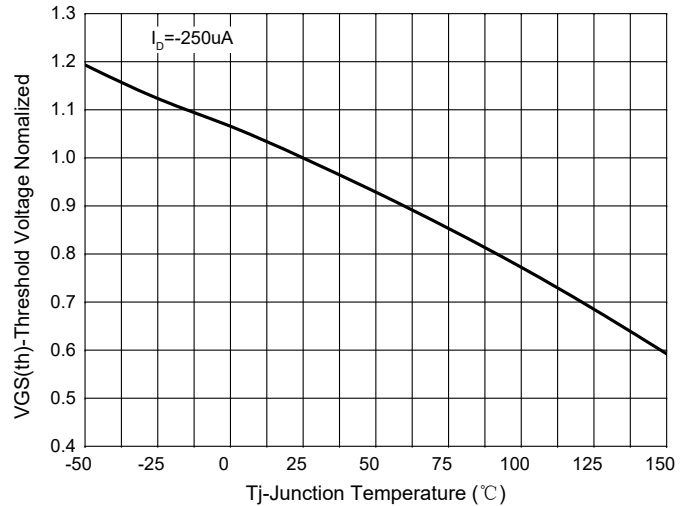


Fig. 6 - Normalized Threshold voltage



Curve Characteristics

Fig. 7 - Capacitance Characteristics

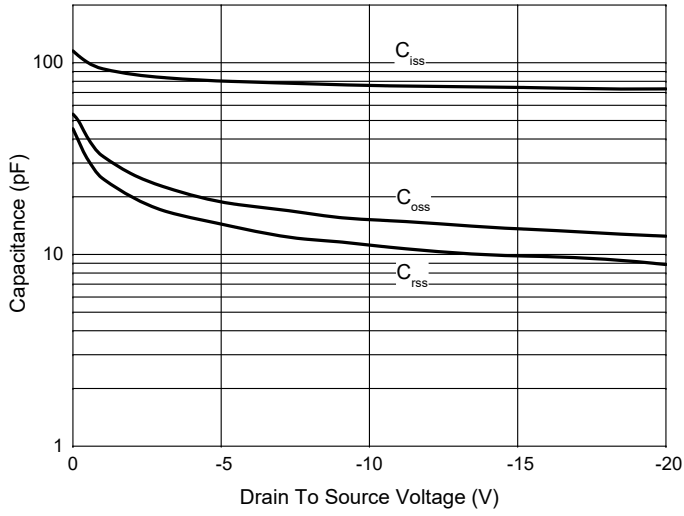


Fig. 8 - GateCharge

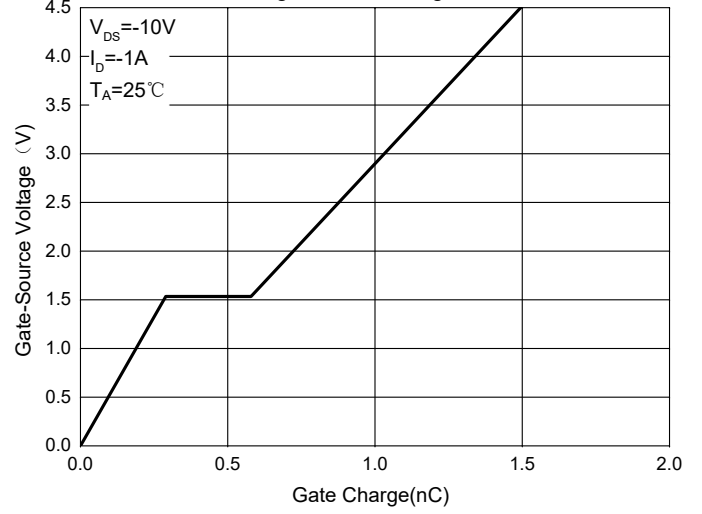


Fig.9-NormalizedOnResistanceCharacteristics

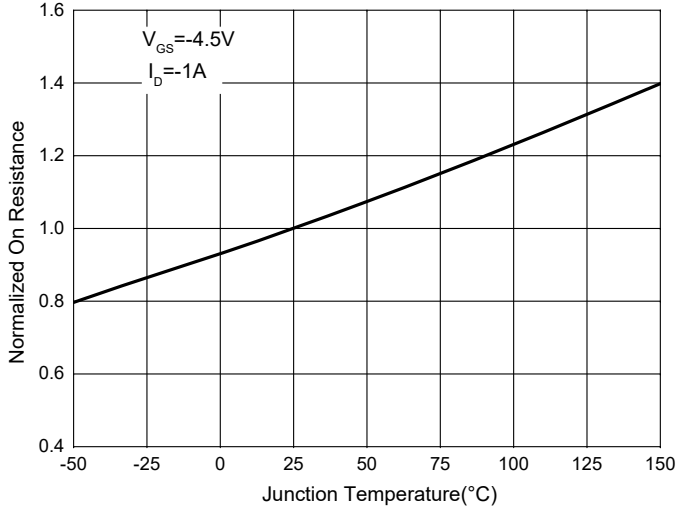


Fig. 10 - Current dissipation

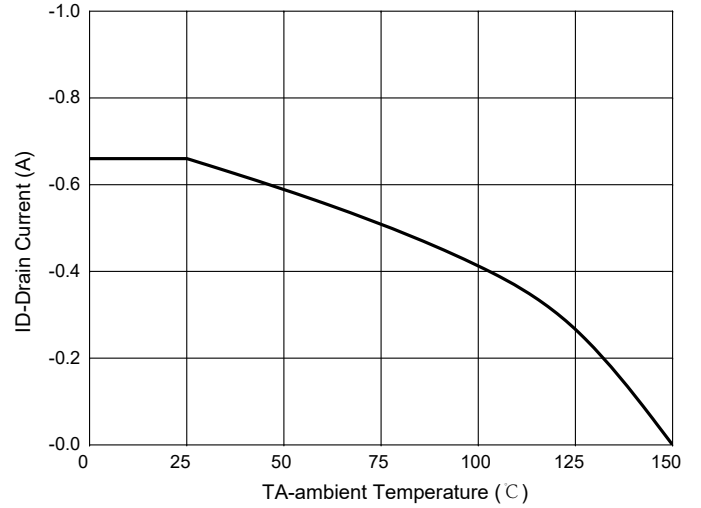
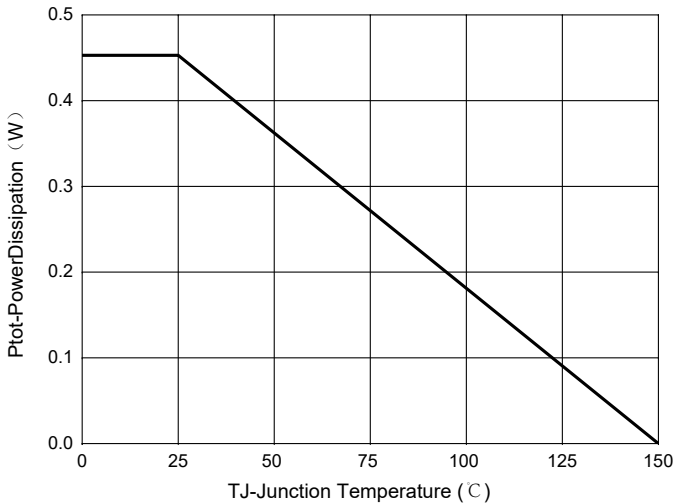


Fig.11-PowerDissipation



Curve Characteristics

Fig. 12 - Safe Operation Area

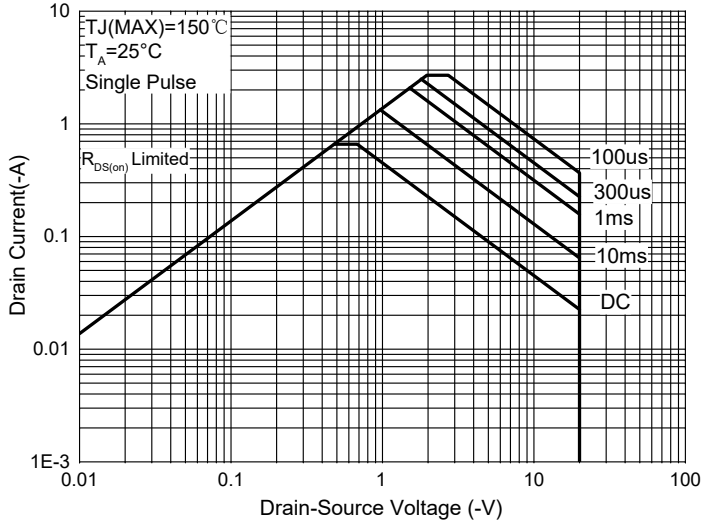
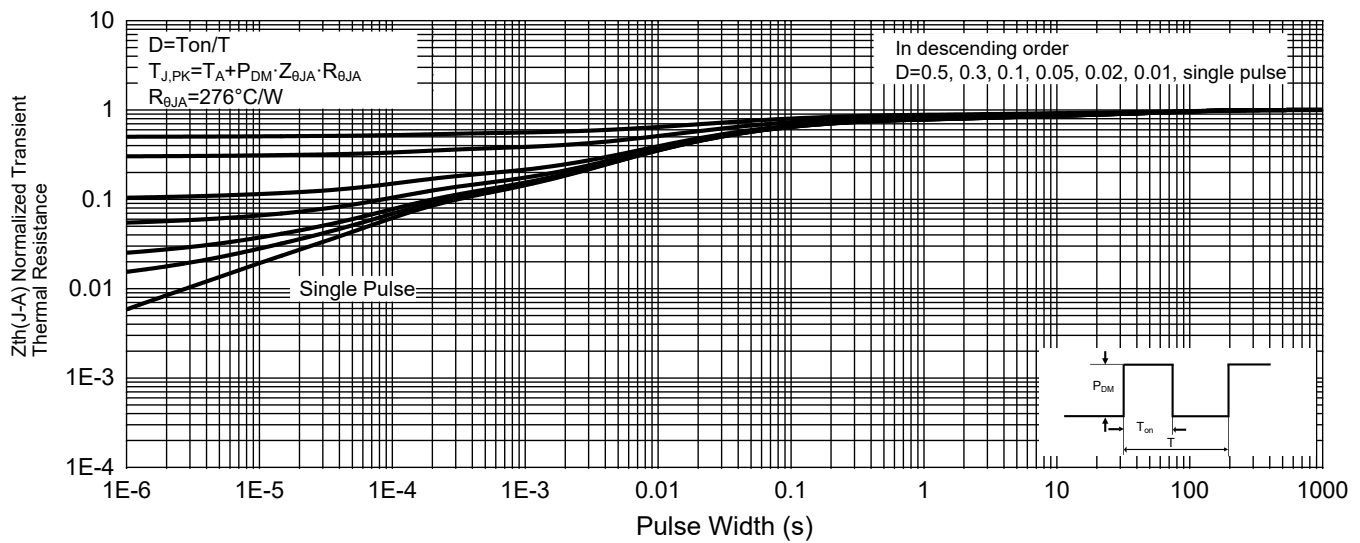


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

Device	Packing
SI3139K-TP	Tape&Reel: 8Kpcs/Reel

## Revision History

Datasheet status	Version No	Release date	Update content
New product datasheet	Rev4-1	20221220	

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