



# SM3415KIDS

## P-Channel Enhancement Mode Field Effect Transistor

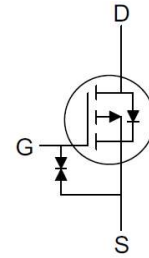
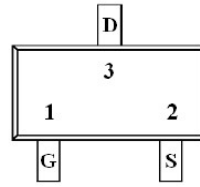
### FEATURES

- $R_{DS(ON)}=39m\Omega@V_{GS}=-4.5V$
- Low gate charge
- ESD protected gate
- Suffix "H" indicates Halogen-free parts, ex. SM3415KIDSH

### APPLICATIONS

- Portable appliances
- Power Management in Note book
- Battery Powered System
- DC/DC Converter

### PIN CONFIGURATION



Pin	Description
1	Gate
2	Source
3	Drain

### Maximum Ratings(Notes 1)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	
Continuous Drain Current (Note 2)	$T_A=25^\circ C$	-4.2	A
	$T_A=70^\circ C$	-3.3	
Pulsed Drain Current (Note 3)	$I_{DM}$	-10.5	A
Power Dissipation (Note 4)	$T_A=25^\circ C$	1.00	W
	$T_C=25^\circ C$	1.56	
Thermal Maximum Junction to Ambient (Note 3)	$R_{\theta JA}$	125	$^\circ C/W$
Thermal Maximum Junction to Case	$R_{\theta JC}$	80	$^\circ C/W$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	$^\circ C$

Note:

1.  $T_A=25^\circ C$ . Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability
2. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
4. Power dissipation is limited by 150 $^\circ C$  junction temperature.



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### Electrical Characteristics ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise specified)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	$V_{(BR)DSS}$	-20	-	-	V
Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	$V_{GS(th)}$	-0.30	-0.55	-0.90	V
Gate Leakage Current	$V_{DS}=0V, V_{GS}=\pm 8V$	$I_{GSS}$	-	-	$\pm 10$	$\mu A$
Zero Gate Voltage Drain Current	$V_{DS}=-16V, V_{GS}=0V$	$I_{DSS}$	-	-	-1	$\mu A$
Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-4.0A$	$R_{DS(on)}$	-	32	39	m $\Omega$
	$V_{GS}=-2.5V, I_D=-4.0A$		-	39	51	
	$V_{GS}=-1.8V, I_D=-2.0A$		-	50	64	
Diode Forward Voltage (Note 3)	$V_{GS}=0V, I_S=-1A$	$V_{SD}$	-	-0.85	-1.10	V
Forward Transconductance	$V_{DS}=-5V, I_D=-4A$	$g_{FS}$	-	11	-	S
<b>Dynamic (Note 5)</b>						
Total Gate Charge	$V_{DS}=-10V, V_{GS}=-2.5V, I_D=-4A$	$Q_g$	-	5.1	-	nC
			-	6.8	-	
			-	6.8	-	
Gate-Source Charge	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-4A$	$Q_{gs}$	-	1.9	-	nC
Gate-Drain Charge		$Q_{gd}$	-	2.2	-	
Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$	$C_{iss}$	-	1029	-	pF
Output Capacitance		$C_{oss}$	-	102	-	
Reverse Transfer Capacitance		$C_{rss}$	-	79	-	
Turn on Delay Time		$t_{d(on)}$	-	10	-	
Turn on Rise Time	$V_{DS}=-10V, R_{GEN}=3\Omega$	$t_r$	-	30	-	
Turn off Delay Time	$I_D=-4A, V_{GS}=-4.5V$	$t_{d(off)}$	-	55	-	
Turn off Fall Time		$t_f$	-	15	-	

Note:

5. Guarantee by design, not test in mass production



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### RATINGS AND CHARACTERISTIC CURVES

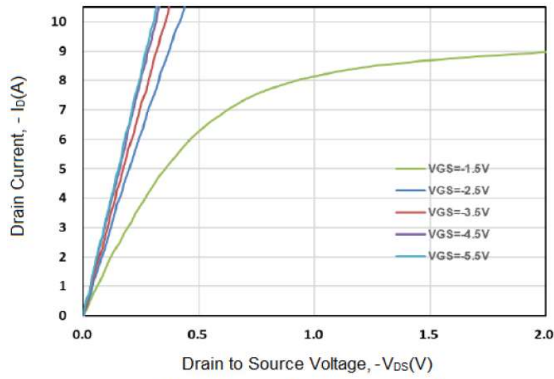


Fig.1 Output Characteristics

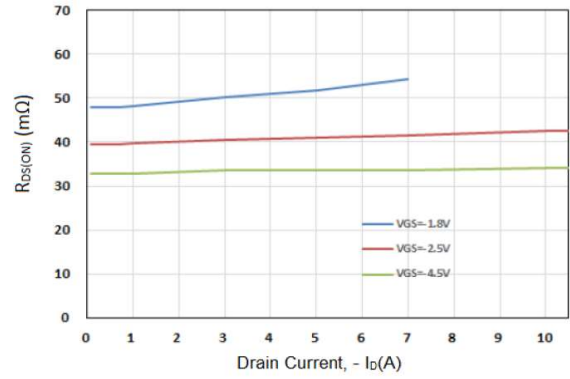


Fig.2 On-Resistance vs.  $I_D$

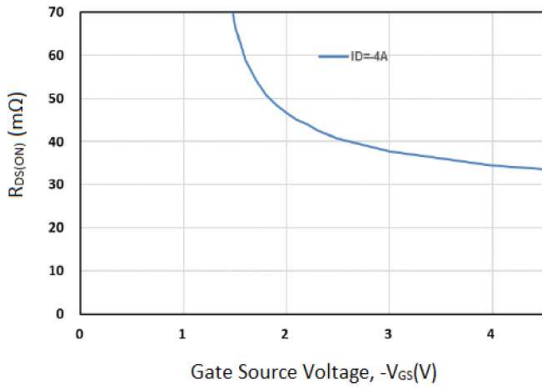


Fig.3 On-Resistance vs.  $V_{GS}$

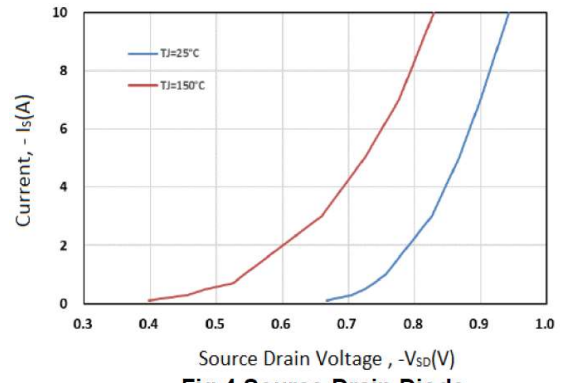


Fig.4 Source-Drain Diode

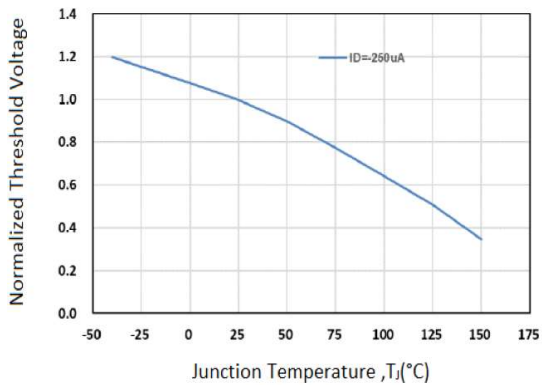


Fig.5 On-Resistance vs.  $V_{GS}$

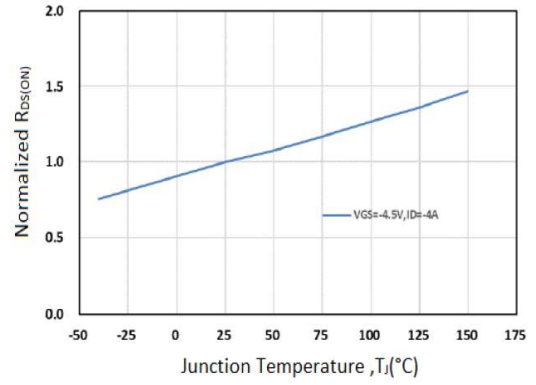


Fig.6 Source-Drain Diode Forward

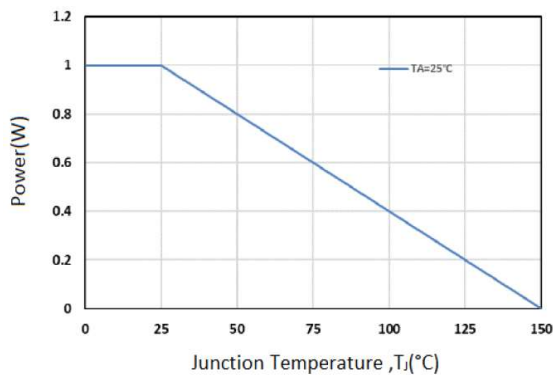


Fig.7 Power Dissipation

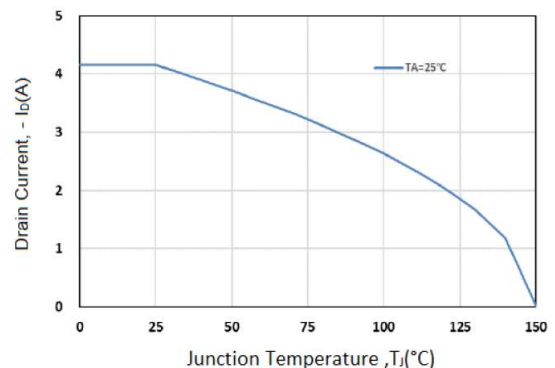


Fig.8 Drain Current



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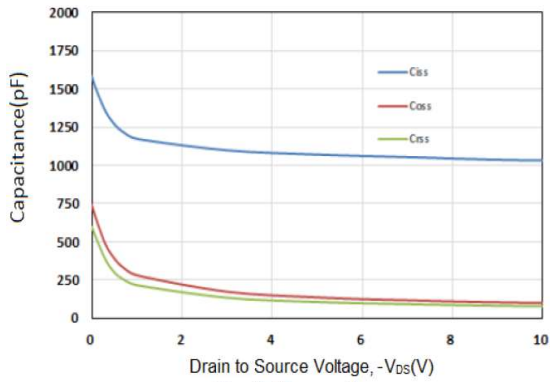


Fig.9 Capacitance

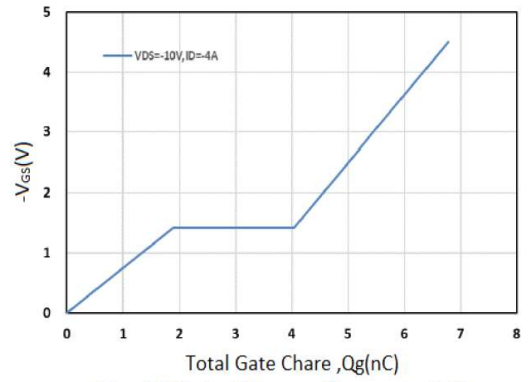


Fig.10 Gate Charge Characteristics

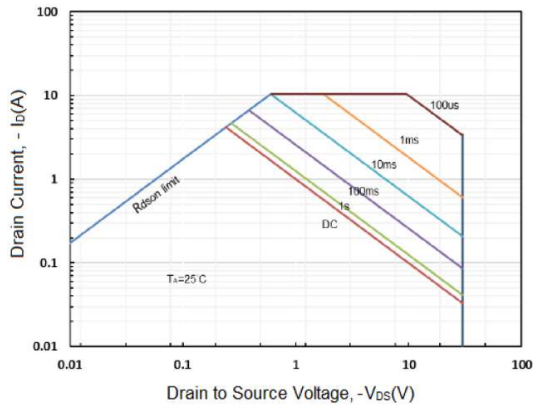


Fig.11 Safe Operating Area

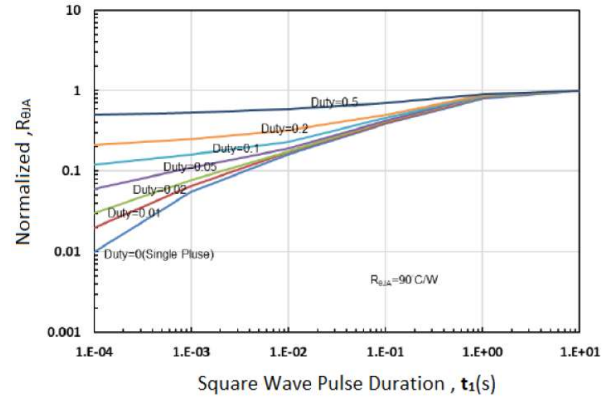


Fig.12  $R_{\theta JA}$  Transient Thermal Impedance

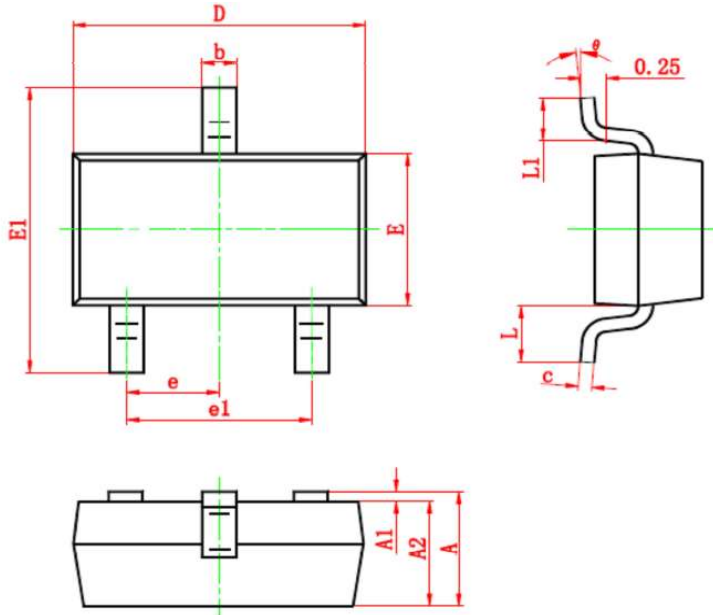


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### Package Dimension

### SOT-23



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
A2	0.90	1.05	0.035	0.041
b	0.30	0.50	0.012	0.020
c	0.08	0.15	0.003	0.006
D	2.80	3.00	0.110	0.118
E	1.20	1.40	0.047	0.055
E1	2.25	2.55	0.089	0.100
e	TYP 0.95		TYP 0.037	
e1	1.80	2.00	0.071	0.079
L	REF 0.55		REF 0.022	
L1	0.30	0.50	0.012	0.020
$\theta$	0°	8°	0°	8°