

# FH8815

## N-Channel Enhancement Mode Power MOSFET

### Descriptions

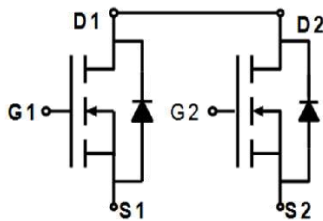
The FH8815 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WNMD2167 is Pb-free.

### Applications

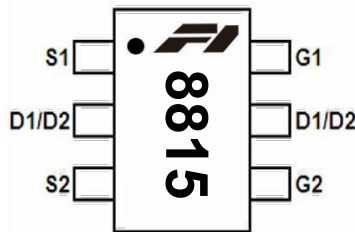
- DC-DC converter circuit
- Power Switch

### Product Summary

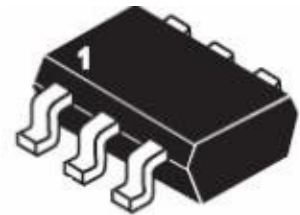
$V_{DS}$ (V)	Typical $R_{DS(on)}$ ( $\Omega$ )
20	0.014 @ $V_{GS}=4.5V$
	0.015 @ $V_{GS}=3.8V$
	0.016.5 @ $V_{GS}=3.1V$
	0.018 @ $V_{GS}=2.5V$



Schematic diagram



Marking and pin Assignment



SOT23-6 top view

### Absolute Maximum ratings

Parameter	Symbol	10 S	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	20		V	
Gate-Source Voltage	$V_{GS}$	$\pm 10$		V	
Continuous Drain Current <sup>a,d</sup>	$I_D$	$T_A=25^\circ C$	6.3	5.7	A
		$T_A=70^\circ C$	5.0	4.6	
Maximum Power Dissipation <sup>a,d</sup>	$P_D$	$T_A=25^\circ C$	1.1	0.9	W
		$T_A=70^\circ C$	0.7	0.6	
Continuous Drain Current <sup>b</sup>	$I_D$	$T_A=25^\circ C$	5.8	5.2	A
		$T_A=70^\circ C$	4.6	4.1	
Maximum Power Dissipation <sup>b</sup>	$P_D$	$T_A=25^\circ C$	0.9	0.7	W
		$T_A=70^\circ C$	0.6	0.5	
Pulsed Drain Current <sup>c</sup>	$I_{DM}$	30		A	
Operating Junction Temperature	$T_J$	-55 to 150		$^\circ C$	
Lead Temperature	$T_L$	260		$^\circ C$	
Storage Temperature Range	$T_{stg}$	-55 to 150		$^\circ C$	

### Thermal resistance ratings

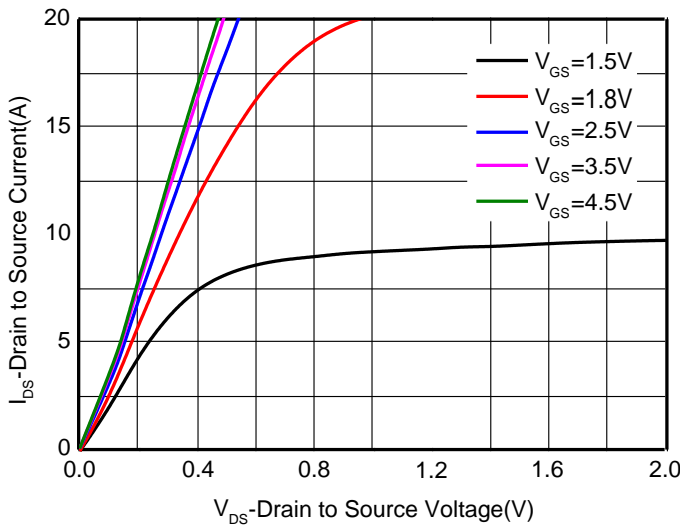
Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance <sup>a</sup>	t ≤ 10 s	R <sub>θJA</sub>	76	94	°C/W
	Steady State		115	145	
Junction to Ambient Thermal Resistance <sup>b</sup>	t ≤ 10 s	R <sub>θJA</sub>	92	115	
	Steady State		135	175	
Junction-to-Case Thermal Resistance	Steady State	R <sub>θJC</sub>	63	78	
Dual Operation					
Junction to Ambient Thermal Resistance <sup>a</sup>	t ≤ 10 s	R <sub>θJA</sub>	79	97	°C/W
	Steady State		118	148	
Junction-to-Ambient Thermal Resistance <sup>b</sup>	t ≤ 10 s	R <sub>θJA</sub>	96	118	
	Steady State		138	180	
Junction-to-Case Thermal Resistance	Steady State	R <sub>θJC</sub>	66	81	

- a Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper
- b Surface mounted on FR-4 board using minimum pad size, 1oz copper
- c Pulse width < 380μs, Duty Cycle < 2%
- d Maximum junction temperature T<sub>J</sub> = 150°C.

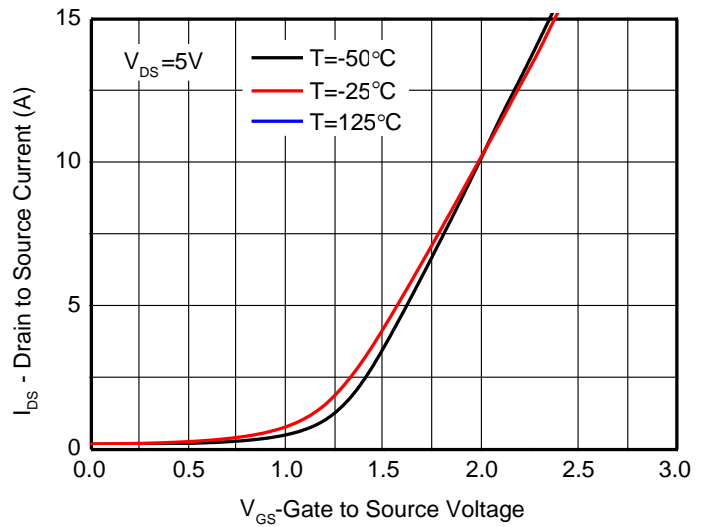
## Electronics Characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250uA	20			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0V			1	uA
Gate-to-source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±10V			±1	uA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250uA	0.5	0.7	1.0	V
Drain to source On resistance <sup>b, c</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2 A	12	14	17	mΩ
		V <sub>GS</sub> = 3.8V, I <sub>D</sub> = 2 A	13	15	18	
		V <sub>GS</sub> = 3.1V, I <sub>D</sub> = 2 A	14	16.5	19	
		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 1.5A	15	18	21.5	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 5.0 V, I <sub>D</sub> = 6.3A		16		S
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1MHz, V <sub>DS</sub> = 10 V		850		pF
Output Capacitance	C <sub>OSS</sub>			127		
Reverse Transfer Capacitance	C <sub>RSS</sub>			115		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DD</sub> = 10 V, D = 6.3 A		10.9		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			0.62		
Gate-to-Source Charge	Q <sub>GS</sub>			1.92		
Gate to Drain Charge	Q <sub>GD</sub>			2.0		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	td(ON)	V <sub>GS</sub> = 4.5 V, V <sub>DD</sub> = 10 V, R <sub>L</sub> = 2Ω, R <sub>G</sub> = 6 Ω		22		ns
Rise Time	tr			18		
Turn Off Delay Time	td(OFF)			62		
Fall Time	tf			28		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 1.0A		0.65	1.5	V

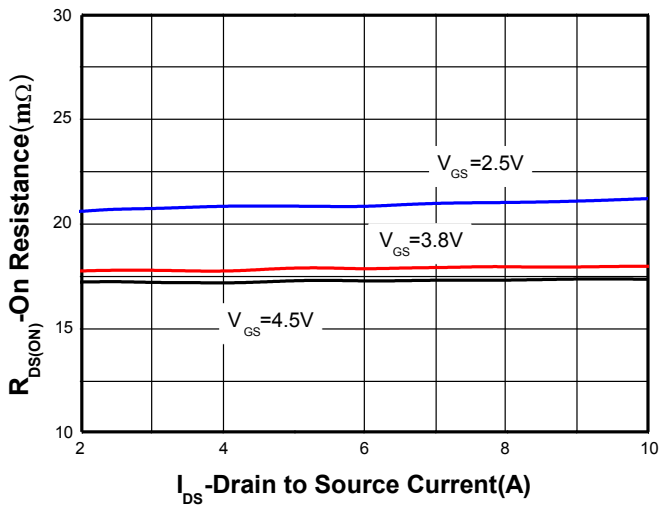
## Typical Characteristics (Ta=25°C, unless otherwise noted)



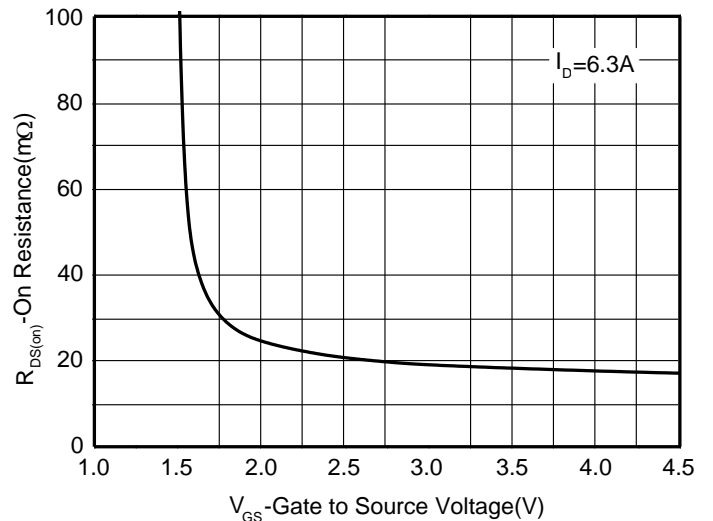
**Output characteristics**



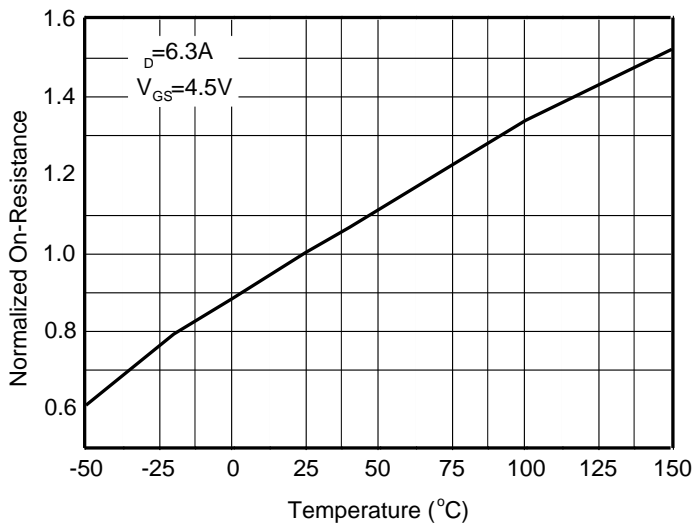
**Transfer characteristics**



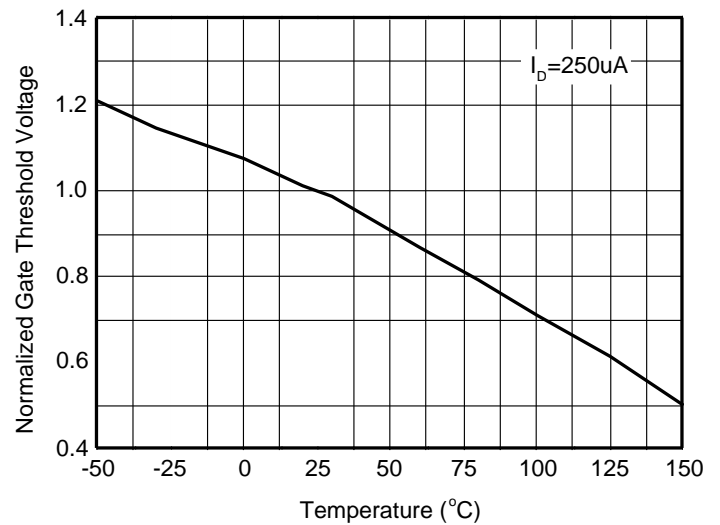
**On-Resistance vs. Drain current**



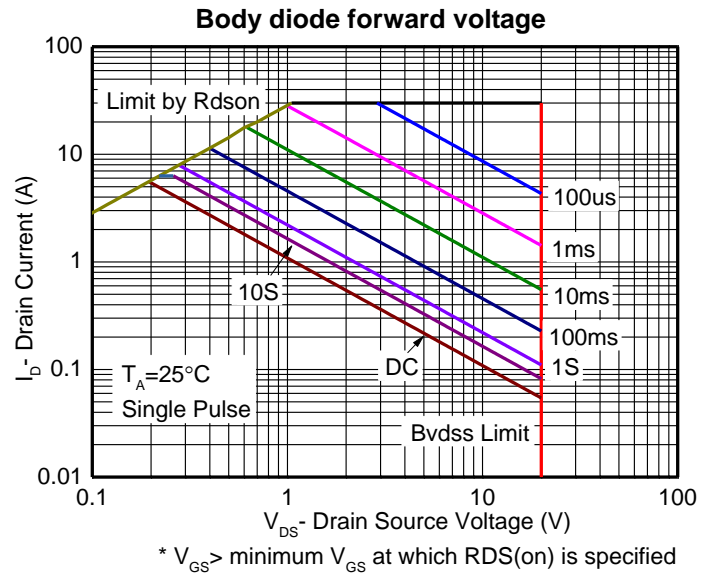
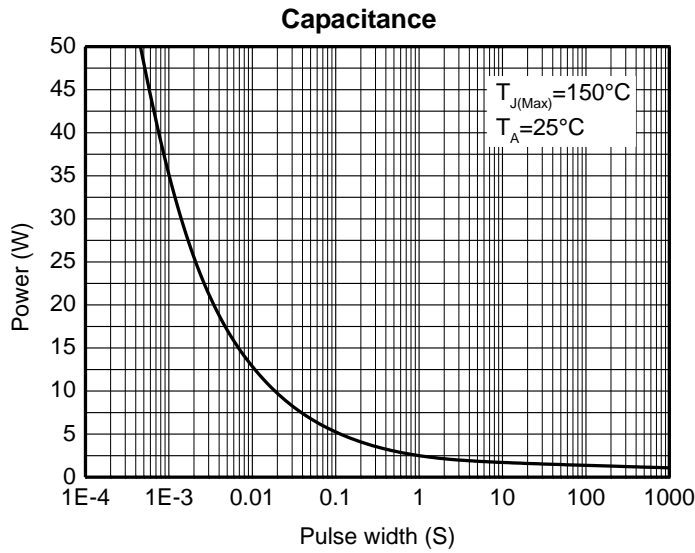
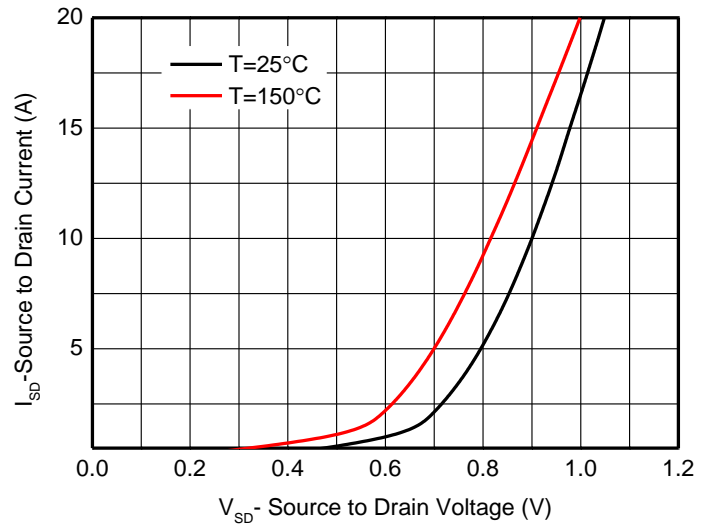
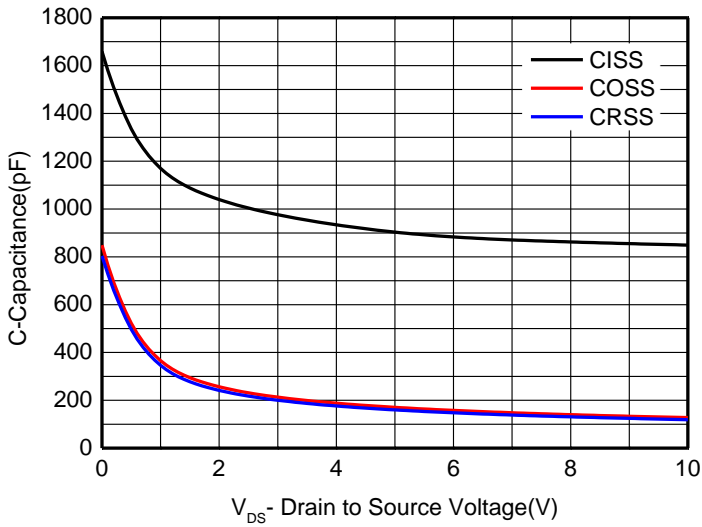
**On-Resistance vs. Gate-to-Source voltage**



**On-Resistance vs. Junction temperature**

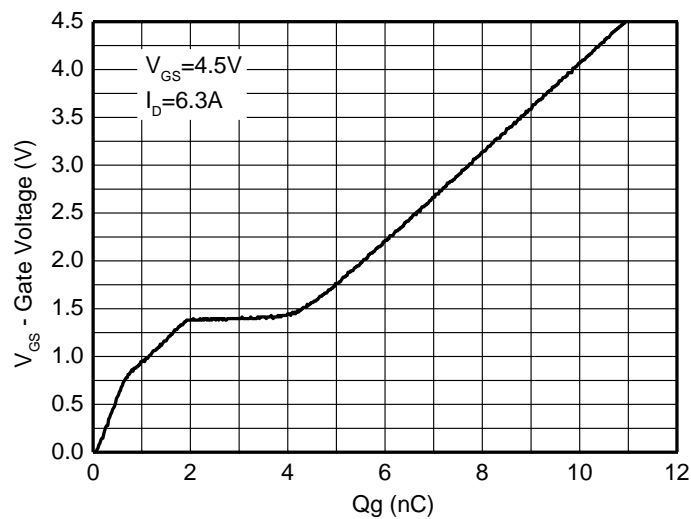


**Threshold voltage vs. Temperature**

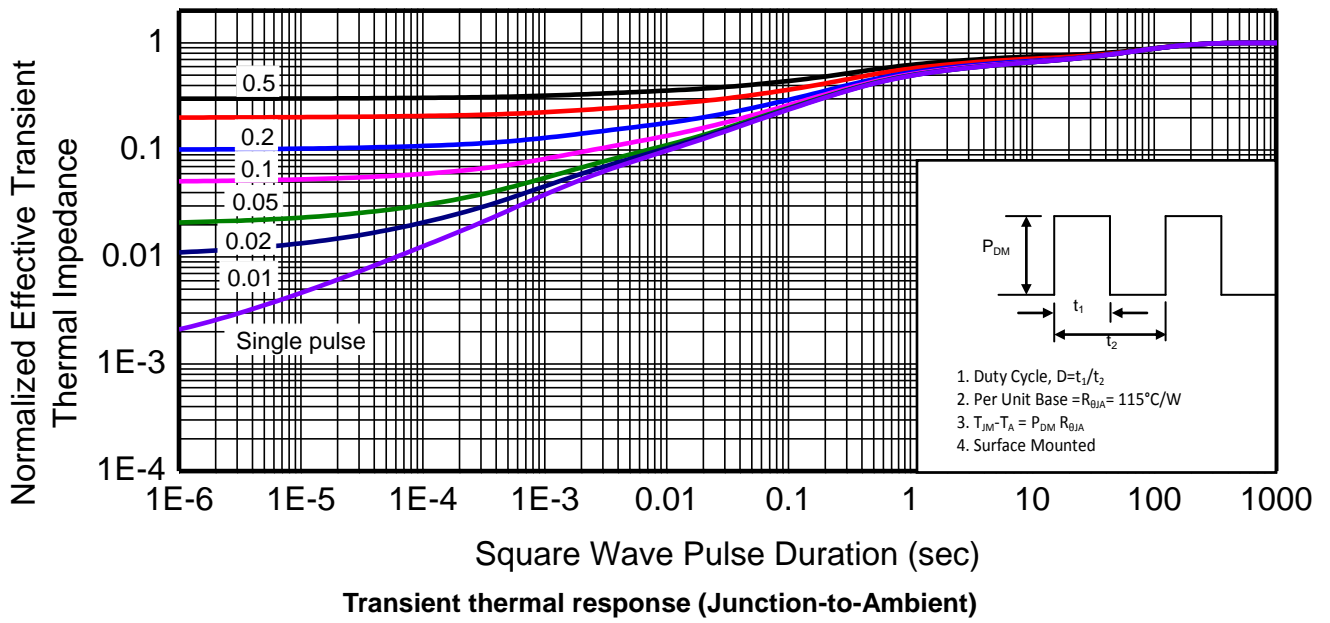


Single pulse power

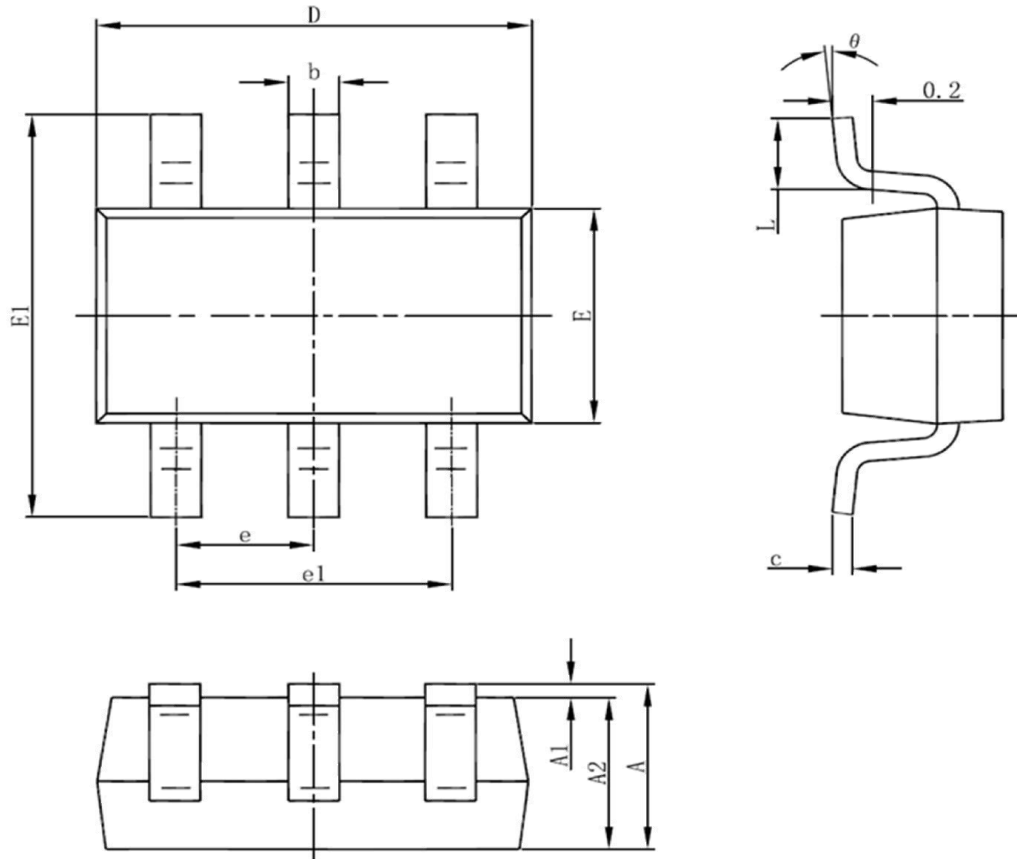
Safe operating power



Gate Charge Characteristics



SOT23-6L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°