WPM2045

Integrated P-Channel Power MOSFET (-20V, -2.8A) and Schottky Diode

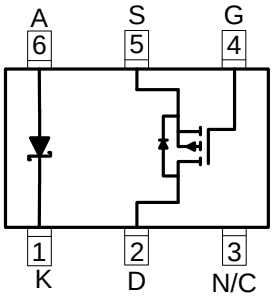
Http://www.sh-willsemi.com

MOSFET	
V_{DS} (V)	Typical Rdson (Ω)
-20	0.093@ V_{GS}=-4.5V
	0.122@ V_{GS}=-2.5V
	0.160@ V_{GS}=-1.8V
Schottky	
V_R(V)	Typical V_F (V)
20	0.4@0.5A

SOT-23-6L

Descriptions

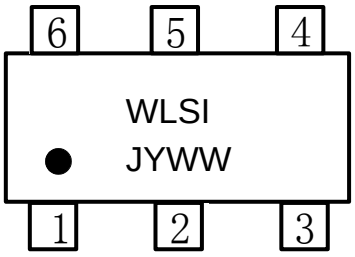
The WPM2045 is the P-Channel enhancement MOS Field Effect Transistor and Schottky Diode as a single package for DC-DC converter or level shift applications, uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Standard Product WPM2045 is Pb-free.



Pin configuration (Top View)

Features

- Small package SOT-23-6L
- Featuring a MOSFET and Schottky Diode
- Independent Pin out to each Device to Ease Circuit Design
- Ultra Low V_F Schottky Diode



WLSI= Willsemi
J = Device Code
YWW= Date Code
Marking

Applications

- Li--Ion Battery Charging
- High Side DC-DC Conversion Circuits
- High Side Drive for Small Brushless DC Motors
- Power Management in Portable, Battery Powered Products

Order Information

Device	Package	Shipping
WPM2045-6/TR	SOT-23-6L	3000/Tape&Reel

Absolute Maximum Ratings (P-Channel ,T_A=25°C unless otherwise noted)

Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	-20		V
Gate-Source Voltage		V_{GS}	±8		
Continuous Drain Current [a d]	T_A=25°C	I_D	-2.8	-2.2	A
	T_A=70°C		-2.2	-1.8	
Maximum Power Dissipation [a d]	T_A=25°C	P_D	1.3	0.8	W
	T_A=70°C		0.8	0.5	
Continuous Drain Current [bd]	T_A=25°C	I_D	-2.5	-2.0	A
	T_A=70°C		-2.0	-1.6	
Maximum Power Dissipation [bd]	T_A=25°C	P_D	1.1	0.7	W
	T_A=70°C		0.7	0.4	
Pulsed Drain Current [c]		I_{DM}	-10		A
Operating Junction Temperature		T_J	-55 to 150		°C
Lead Temperature		T_L	260		°C
Storage Temperature Range		T_{stg}	-55 to 150		°C

Absolute Maximum Ratings (Schottky, T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Reverse voltage (repetitive peak)	V_{RM}	20	V
Reverse voltage (DC)	V_R	20	V
Average rectified forward current	I_O	0.5	A
Peak Foward Surge Current [(ef)]	I_{FSM}	5	A
Operating temperature	T_{opr}	-40 ~ 85	°C
Storage temperature	T_{stg}	-55 to 150	°C

Thermal Resistance Ratings (T_A=25°C unless otherwise noted)

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance [a]	t ≤ 10 s	$R_{\theta JA}$	74	92	°C/W
	Steady State		115	143	
Junction-to-Ambient Thermal Resistance [b]	t ≤ 10 s	$R_{\theta JA}$	90	112	
	Steady State		138	172	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	63	78	

a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b Surface mounted on FR4 board using minimum pad size, 1oz copper

c Pulse width<380μs

d Maximum junction temperature T_J=150°C.

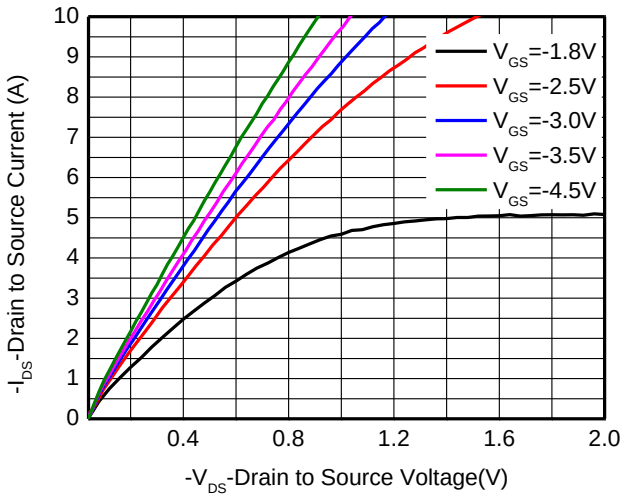
e Current rating is limited by wire-bonding.

f 8.3ms single half sine-wave superimposed on rated load

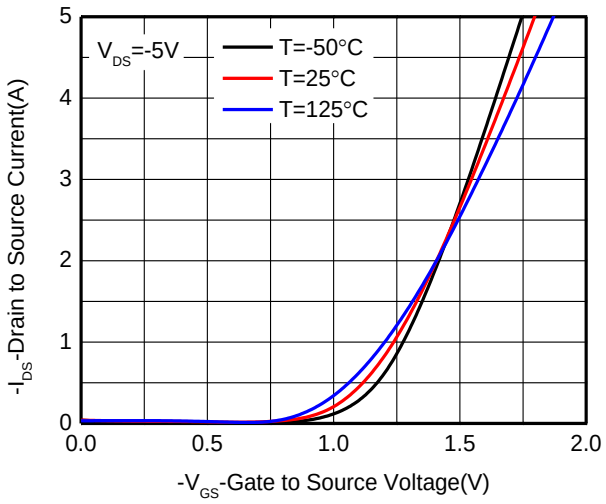
Electronics Characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = -250uA	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =-16 V, V_{GS} = 0V			-1	uA
Gate-to-source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8V			±1	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = -250uA		-0.7	-1.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	V_{GS}=-4.5V, I_D=-2.8A		93	115	mΩ
		V_{GS}=-2.5V, I_D=-2.0A		122	154	
		V_{GS}=-1.8V, I_D=-1.0A		160	198	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{DS}=-10V,V_{GS}=0V, F=1MHZ		531		pF
Output Capacitance	C_{OSS}			61		
Reverse Transfer Capacitance	C_{RSS}			54		
Total Gate Charge	$Q_{G(TOT)}$	V_{DD}=-10V,V_{GS}=-4.5V I_D=-2.8A		8.1		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.82		
Gate-to-Source Charge	Q_{GS}			1.8		
Gate-to-Drain Charge	Q_{GD}			1.1		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	td(ON)	V_{DD}=-10V,I_D=-1.2A, V_{GS}=-4.5V, R_G=6Ω		21.6		ns
Rise Time	tr			8.6		
Turn-Off Delay Time	td(OFF)			58		
Fall Time	tf			8.4		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = -1.0A		-0.8	-1.5	V
SCHOTTKY DIODE CHARACTERISTICS						
Reverse breakdown voltage	V_R	I_R=100uA	20			V
Forward voltage	V_{F1}	I_F=100mA		0.28	0.36	V
	V_{F2}	I_F=500mA		0.41	0.47	
Reverse current	I_R	V_R=20V			150	uA
Diode capacitance	C_D	V_R=5V,F=1MHz		15.8		pF

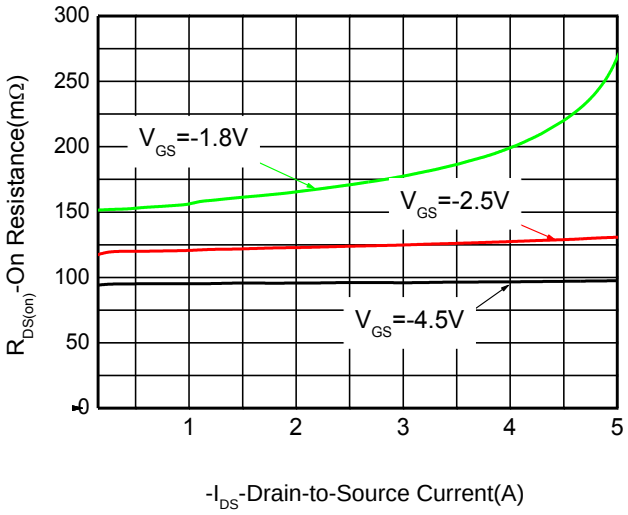
Typical Characteristics（Ta=25°C, unless otherwise noted ）



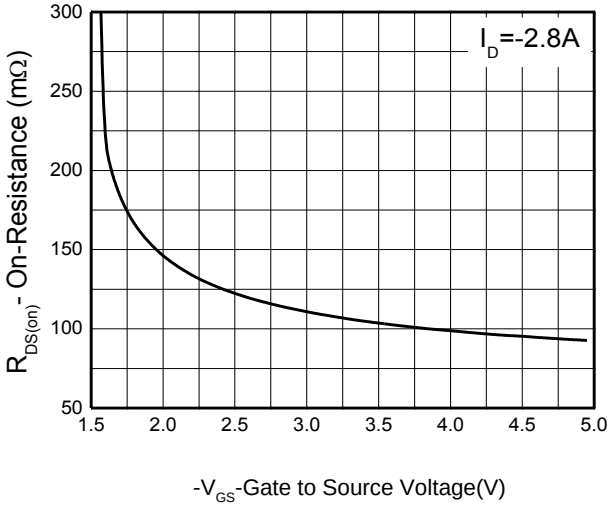
Output characteristics



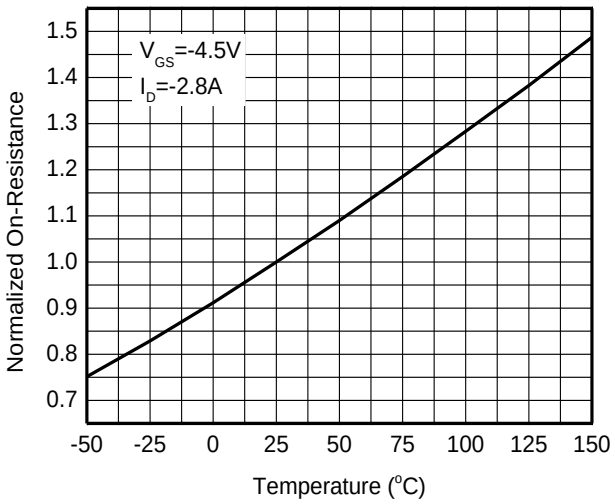
Transfer characteristics



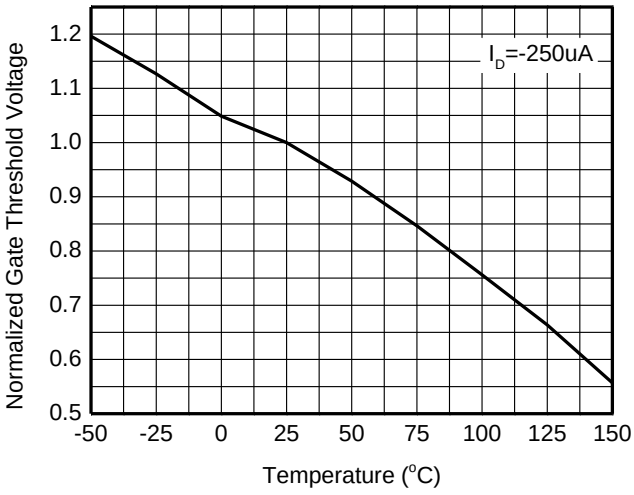
On-Resistance vs. Drain current



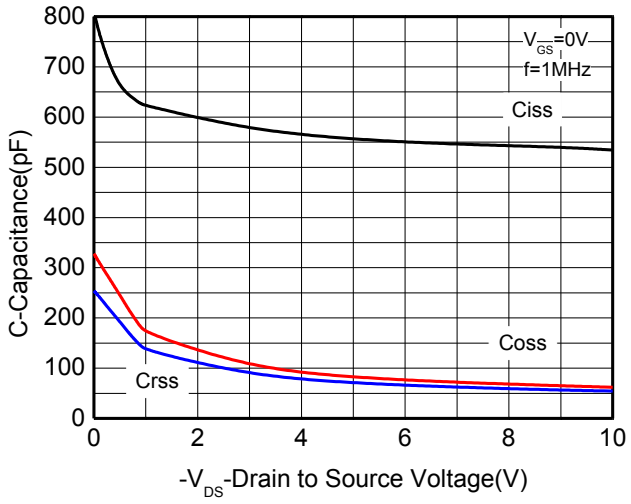
On-Resistance vs. Gate-to-Source voltage



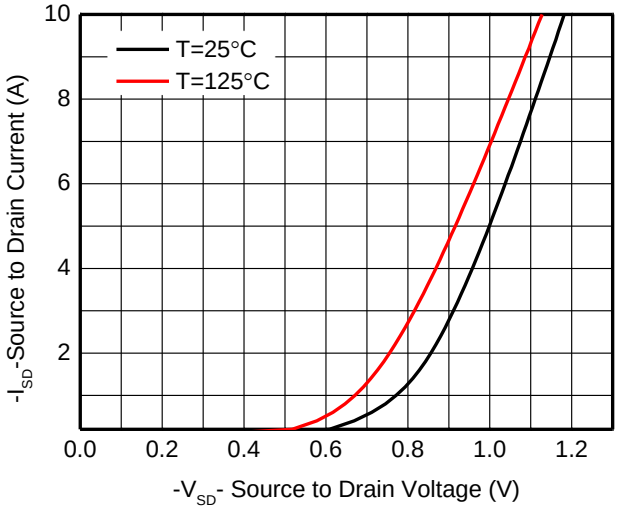
On-Resistance vs. Junction temperature



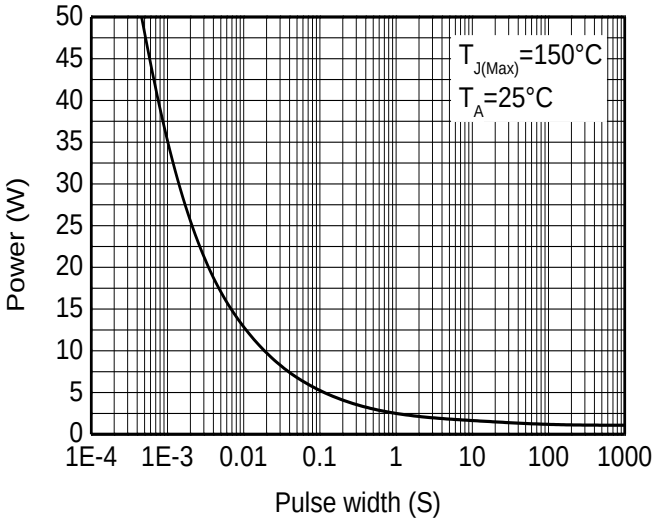
Threshold voltage vs. Temperature



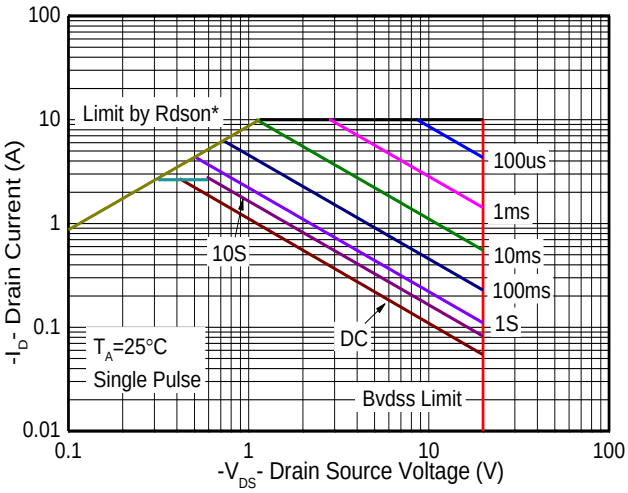
Capacitor



Body diode forward voltage

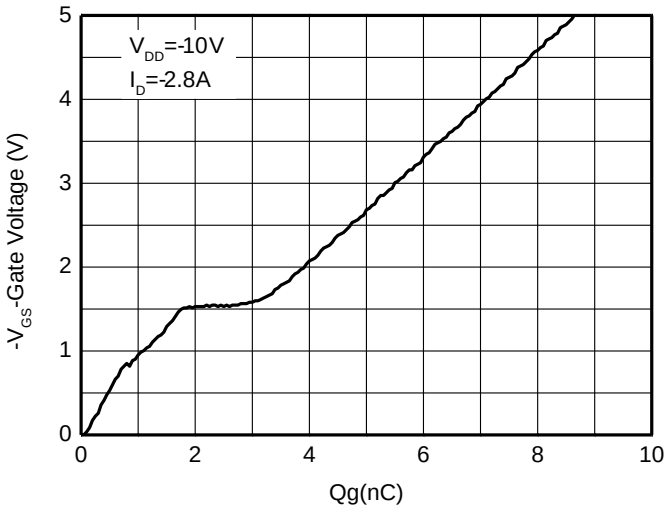


Single pulse power (Junction-to-ambient)

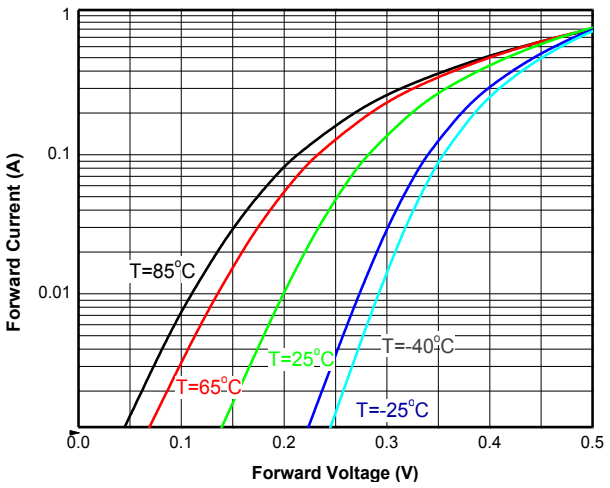


* V_{GS}> minimum V_{GS} at which $R_{DS(on)}$ is specified

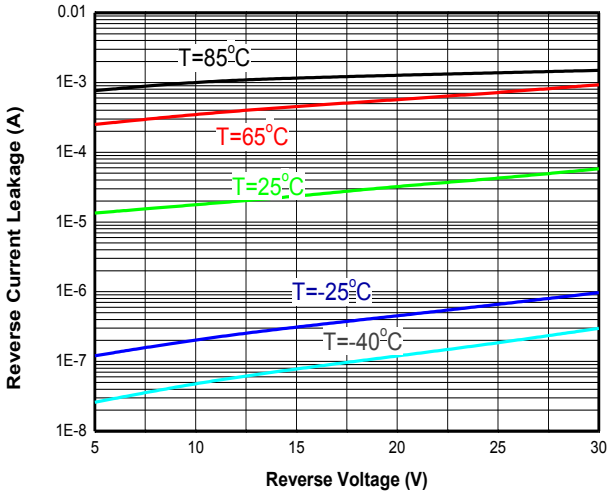
Safe operating power



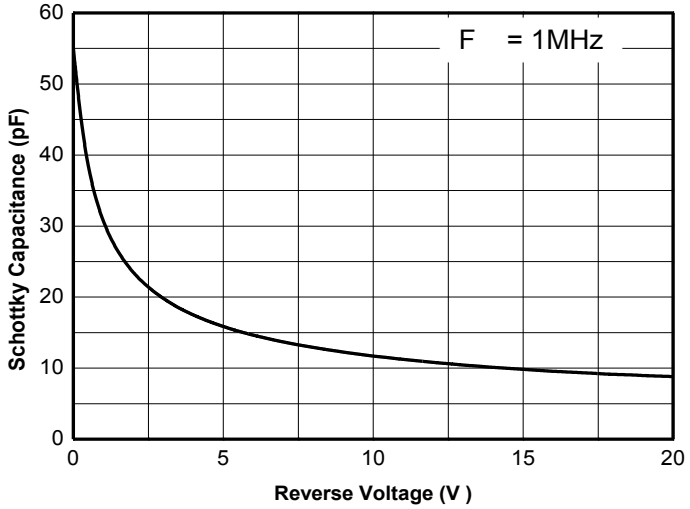
Gate charge Characteristics



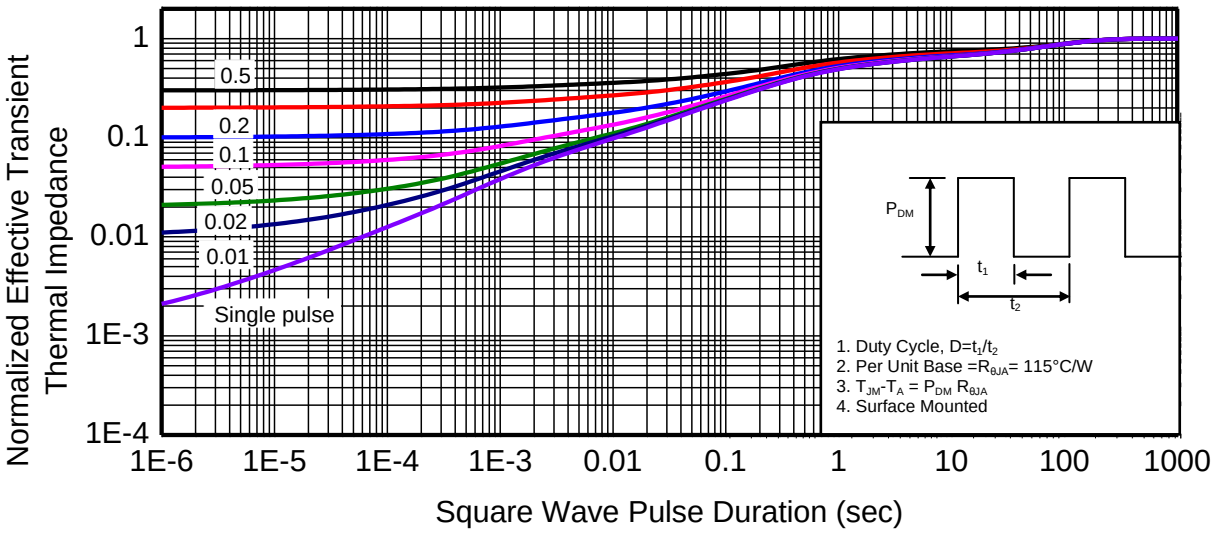
Schottky Diode Forward Current



Schottky Diode Reverse Current



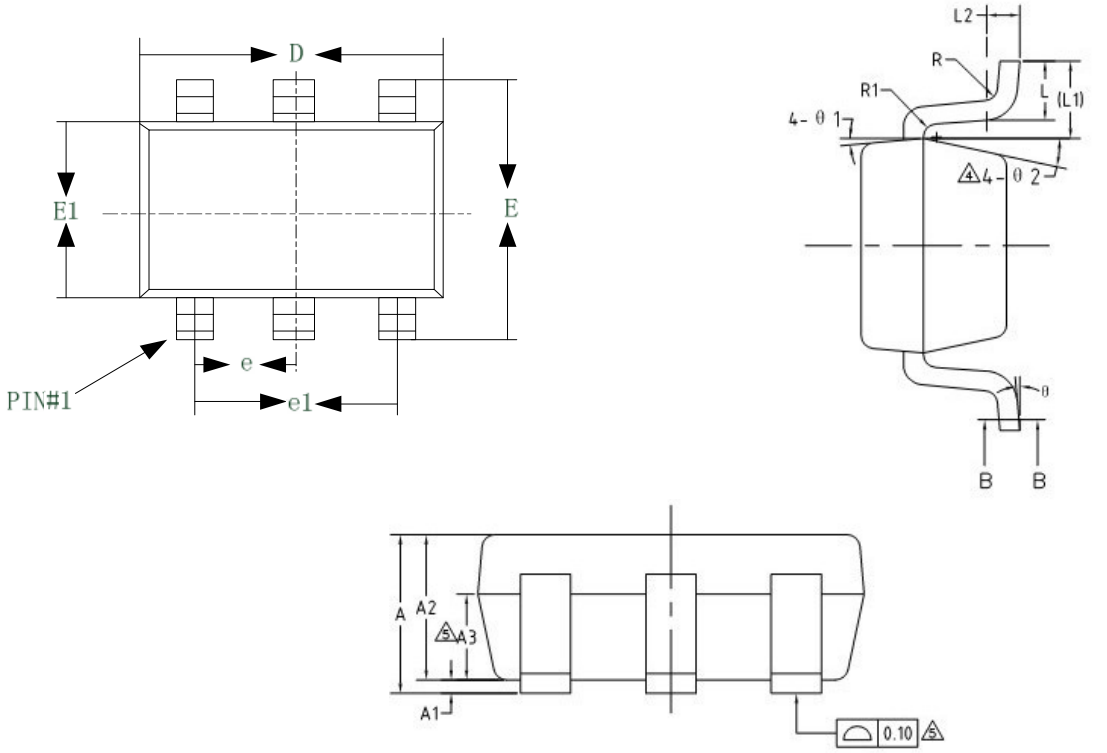
Schottky Capacitance



Transient thermal response (Junction-to-Ambient)

Package outline dimensions

SOT-23-6L



Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	-	0.50
b1	0.36	0.38	0.45
c	0.14	-	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59REF		
L2	0.25BSC		
R	0.10	-	-
R1	0.10	-	0.20
θ	0^0		8^0
θ1	3^0	5^0	7^0
θ2	6^0		14^0