TPAP22811AW5

SINGLE CHANNEL POWER DISTRIBUTION LOAD SWITCH

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Features

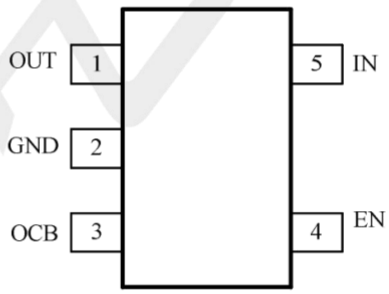
- Wide Supply Voltage Range: 2.5V to 5.5V
- Compliant to USB Specifications
- Current-Limit and Short-Circuit Protections
- Enable Active Low/High
- Typical Rdson 50mΩ**(TYP)** (SOT-23-5L)
- Thermal Shutdown Protection
- Current Limiting Protection
- Hot Plug-In Application(Soft start)
- Guaranteed 2A continuous load current
- Open Drain Fault Flag Output
- Reverse Current Flow Blocking (no body diode)
- RoHS and Halogen free compliance

Applications

- USB Ports
- Notebook and Desktop Computers
- High-Side Power Protection Switchs
- Consumer Electronics
- Telecom Systems
- Digital TV
- USB Device Power Switch
- Motherboard USB Power Switch

General Description

the local USB controller.
Additional features include soft-start to limit the inrush current during plug-in, thermal shutdown
to prevent catastrophic switch failure from high-current loads, under voltage lockout (UVLO) to
ensure that the device remains off unless there is a valid input voltage present. The maximum
current is limited to typically 3.0A in dual ports in accordance with the USB power requirement. The
low quiescent current as 35uA makes this device ideal for portable battery operated equipment.



SOT23-5

Marking:5Y2XQ

Pin Configurations

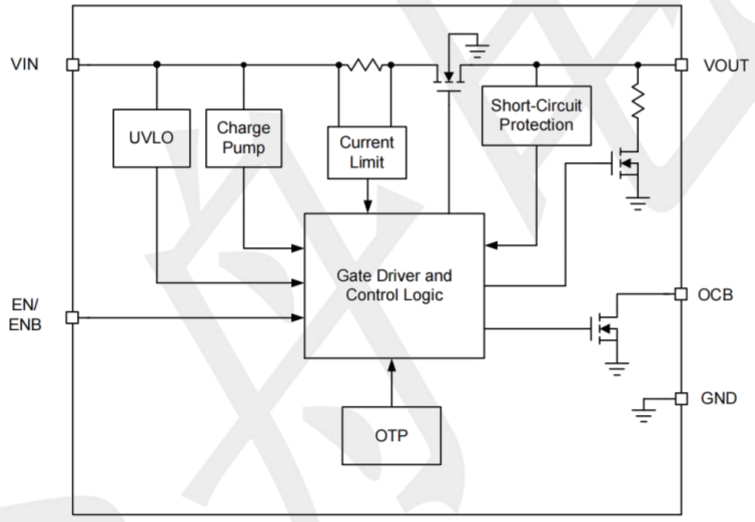
Pin Number	Pin Name	Pin Function
1	VOUT	Output Voltage Pin. The output voltage follows the input voltage. When ENB is high or EN is low, the output voltage is discharged by an internal resistor.
2	GND	Ground.
3	OCB	Fault Indication Pin. This pin goes low when a current limit or an over-temperature condition is detected after a 12ms deglitch time.
4	EN	Enable Input. Pulling this pin to high will enable the device and pulling this pin to low will disable device. The EN pin cannot be left floating.
5	VIN	Power Supply Input. Connect this pin to external DC supply.

Absolute Maximum Ratings

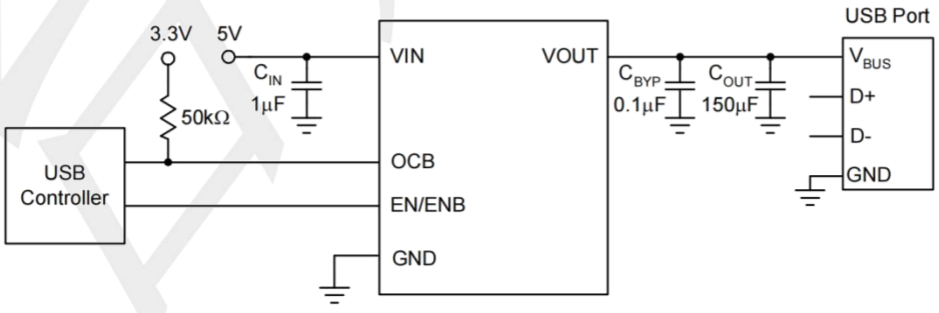
over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT
VIN	Continuous input voltage range	-0.3	6.5	V
VOUT	Output voltage range	-0.3	6.5	
EN	EN pin voltage range	-0.3	6.5	
VCOB	VCOB pin voltage range	-0.3	6.5	
ESD HBM	Human Body ESD Protection	2000		
ESD MM	Machine Model ESD Protection	200		
Temperature	Junction Temperature , TJ	-40	125	℃
	Storage, Tstg	-65	150	
θJA	Thermal Resistance from Junction to ambient	250		°C/W
θJC	Thermal Resistance from Junction to case	130		

BLOCK DIAGRAM



Typical Application Circuit



Electrical Characteristics

(VIN=5V, CIN=1uF, COUT=10uF per channel, TA = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST Conditions	MIN	TYP	MAX	UNIT
Supply Voltage	VIN		2.5	--	5.5	V
Output current	IOUT		0	2	--	A
Under Voltage Lockout	V_{UVLO}	VIN Increase	1.7	2.1	2.4	V
Under Voltage Hysteresis		VIN Decrease	--	100	--	mV
Input Leakage Current	I_{LEAK}	Disabled, OUT grounded	--	0.1	1	uA
Output Leakage Current		Disabled, RLOAD=0Ω	--	0.5	1	uA
Reverse Leakage Current	I_{REV}	Disabled, VIN= 0V, VOUT= 5V	--	0.1	1	uA
Switch On Resistance	R_{DSON}	VIN=5.0V, IOUT=0.5A	--	50	75	mΩ
Supply Current	I_Q	Switch On, VOUT = OPEN	--	35	55	uA
	I_{SHDN}	Switch Off, VOUT = OPEN	--	0.1	1	uA
EN Threshold	V_{IL}	Low Voltage	--	--	0.7	V
	V_{IH}	High Voltage	1.3	--	--	V
EN Input Current	I_{SINK}	VEN From 0V to 5V	--	0.01	--	uA
Current Limit	I_{LIMIT}	VIN= 5V, VOUT= 4.5V, -40℃ ≤ T_A≤85℃	2.2	3.0	3.8	A
Short Circuit Fold back Current	I_{SHORT}	VOUT=0V,Measured prior to the thermal shutdown	--	1.2	--	A
Output Turn-on Rise Time	T_R	VIN=5.0V, CL=1 F, Rload=5Ω, VOUT Rise From 10% to 90%	--	3.0	--	mS
Output Turn-on Delay Time	$T_{D(ON)}$	CL=1uF, Rload=10Ω, EN 10% to VOUT 10%	--	50	--	uS
Output Turn-off Fall Time	T_F	CL=1uF, Rload=10Ω, VOUT Fall From 90% to 10%	--	20	--	uS
Output Turn-off Delay Time	$T_{D(OFF)}$	CL=1uF, Rload=10Ω, EN 90% to VOUT 90%	--	10	--	uS
Reverse Current Limit	I_{RLIMIT}	VIN= 5V, VOUT= 4.5V, -40℃ ≤ T_A≤85℃	--	500	--	mA
Reverse Over Voltage Protect	V_{ROVP}	V_{OUT} - V_{IN}	--	150	--	mV
Reverse Protect Delay Time	T_{PD}		--	5	--	mS
OCB Output Resistance	R_{OCB}	I_{SINK}=1mA	--	20	40	Ω
Output Shutdown Discharge Resistance		Disabled	--	100	150	Ω
Thermal Shutdown Threshold	T_{SD}	Enabled	--	150	--	℃
Thermal Shutdown Hysteresis	T_{HYS}	V_{OUT} = 0V	--	20	--	℃

Note: 1. Test condition: the device is mounted on FR-4 substrate PC board, with minimum recommended pad layout.

Function Description

VIN Under-Voltage Lockout (UVLO)

power switches have a built-inunder-voltage lockout circuit to keep the output shutting off until internal circuitry is operating properly. The UVLO circuit has hysteresis and a de-glitch feature so that it will typically ignore undershoot transients on the input. When input voltage exceeds the UVLO threshold, the output voltage starts a soft-start to reduce the inrush current.

Power Switch

The power switch is an N-channel MOSFET with a low RDS(ON). The internal power MOSFET does not have the body diode. When IC is off, the MOSFET prevents a cur rent flowing from the VOUT back to VIN and VIN to VOUT.

Current-Limit Protection

power switches provide the current-limit protection function. During current limit, the devices limit output current at current limit threshold. For reliable operation, the device should not be operated in current limit for extended period.

Short-Circuit Protection

When the output voltage drops below VIN-1V, which is caused by an over-load or a short-circuit, the devices limit the output current down to a safe level. The short-circuit current limit is used to reduce the power dissipation during short-circuit conditions. If the junction temperature reaches over-temperature threshold, the device will enter the thermal shutdown.

OCB Output

power switches provide an open-drain output to indicate that a fault has occurred.When any of current-limit or over-temperature protection occurs for a deglitch time of $t_{D(OCB)}$, the OCB goes low. Since the OCB pin is an open-drain output, connecting a resistor to a pull high voltage is necessary.

Enable/Disable

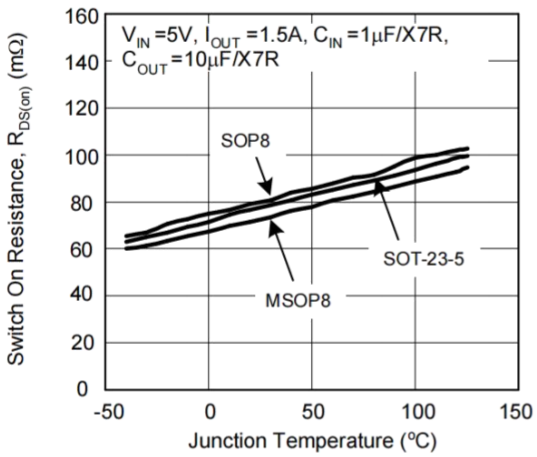
Pull the EN below 0.8V will disable the device, or EN above 2V will enable the device. When the IC is disabled, the supply current is reduced to less than 1m A. The enable input is compatible with both TTL and CMOS logic levels. The EN pin cannot be left floating.

Over-Temperature Protection

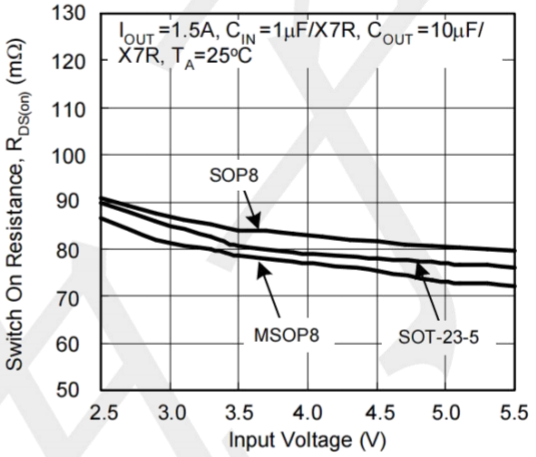
When the junction temperature exceeds 140℃, the internal thermal sense circuit turns off the power FET and allows the device to cool down. When the device's junction temperature cools by 20℃, the internal thermal sense circuit will enable the device, resulting in a pulsed output during continuous thermal protection. Thermal protection is designed to protect the IC in the event of over temperature conditions. For normal operation, the junction temperature cannot exceed TJ =+125℃.

Typical Operating Characteristics

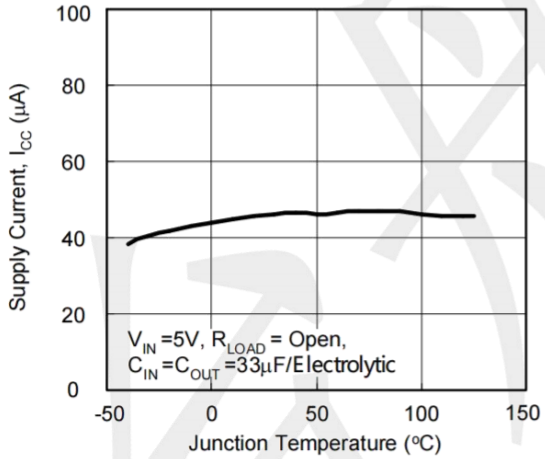
Switch On Resistance vs. Junction Temperature



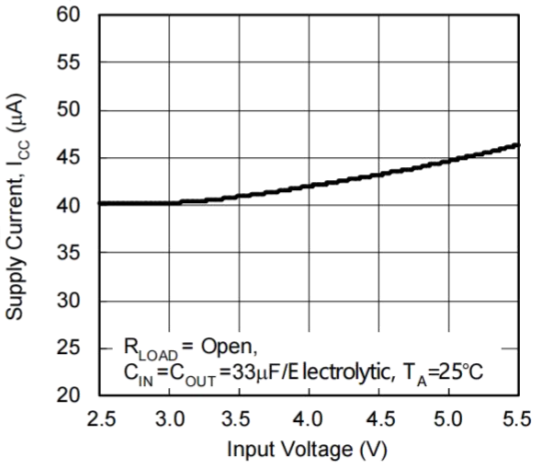
Switch On Resistance vs. Input Voltage



Supply Current vs. Junction Temperature

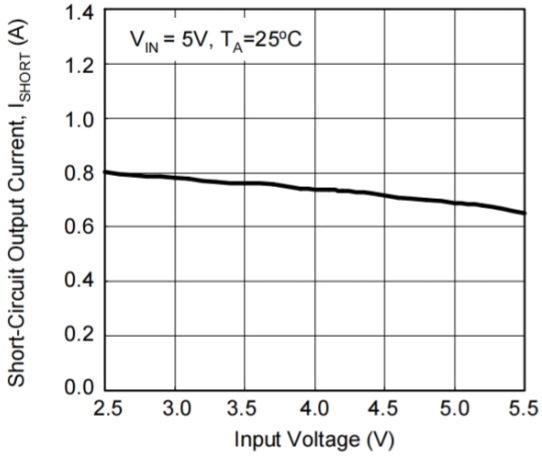


Supply Current vs. Input Voltage

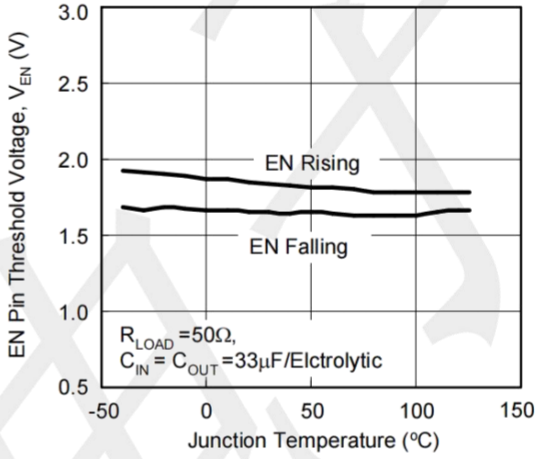


Typical Operating Characteristics(Cont.)

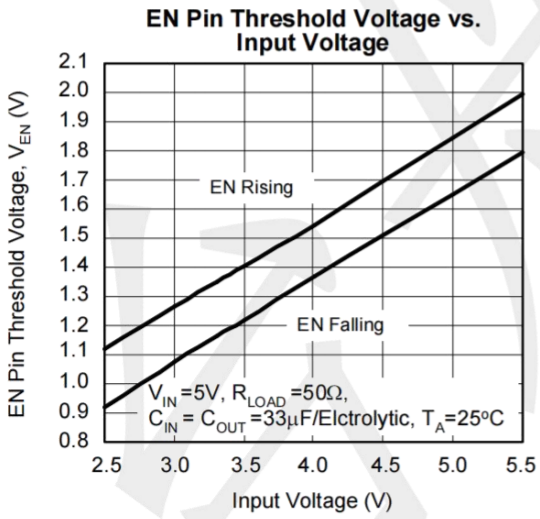
Short-Circuit Output Current vs. Input Voltage



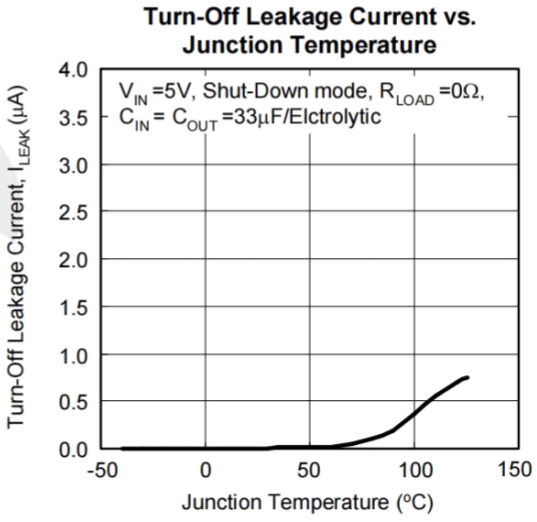
EN Pin Threshold Voltage vs. Junction Temperature



EN Pin Threshold Voltage vs. Input Voltage

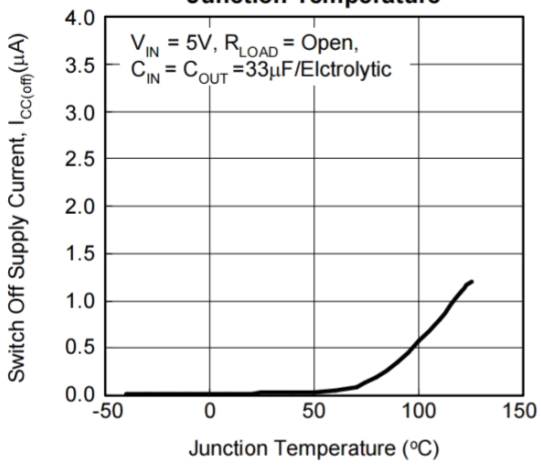


Turn-Off Leakage Current vs. Junction Temperature

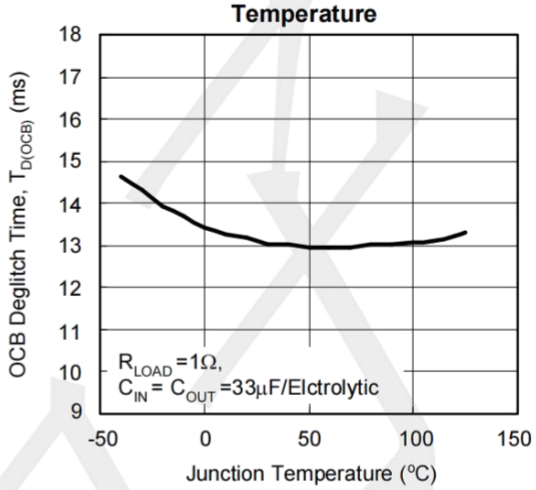


Typical Operating Characteristics(Cont.)

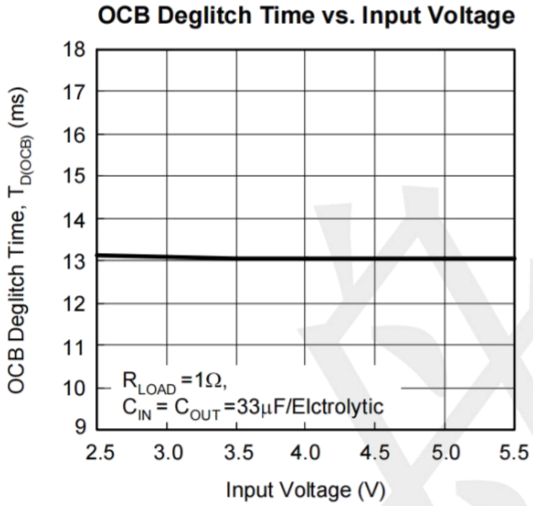
Switch Off Supply Current vs. Junction Temperature



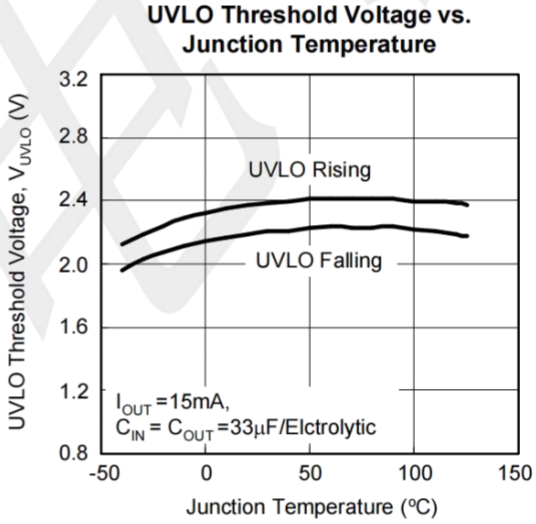
OCB Deglitch Time vs. Junction Temperature



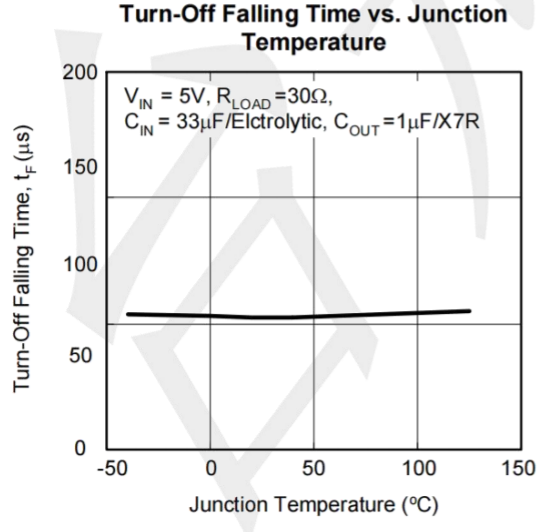
OCB Deglitch Time vs. Input Voltage



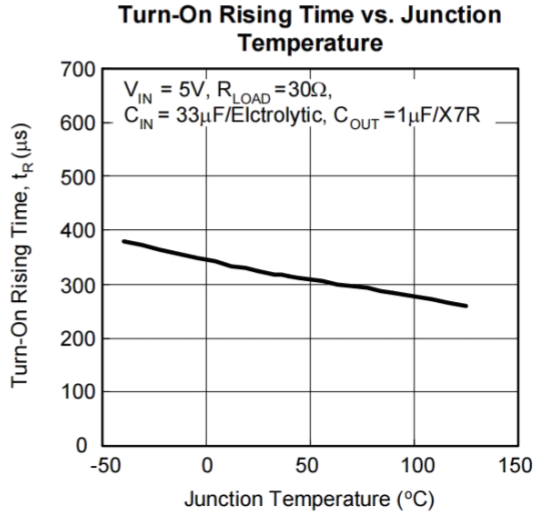
UVLO Threshold Voltage vs. Junction Temperature



Turn-Off Falling Time vs. Junction Temperature

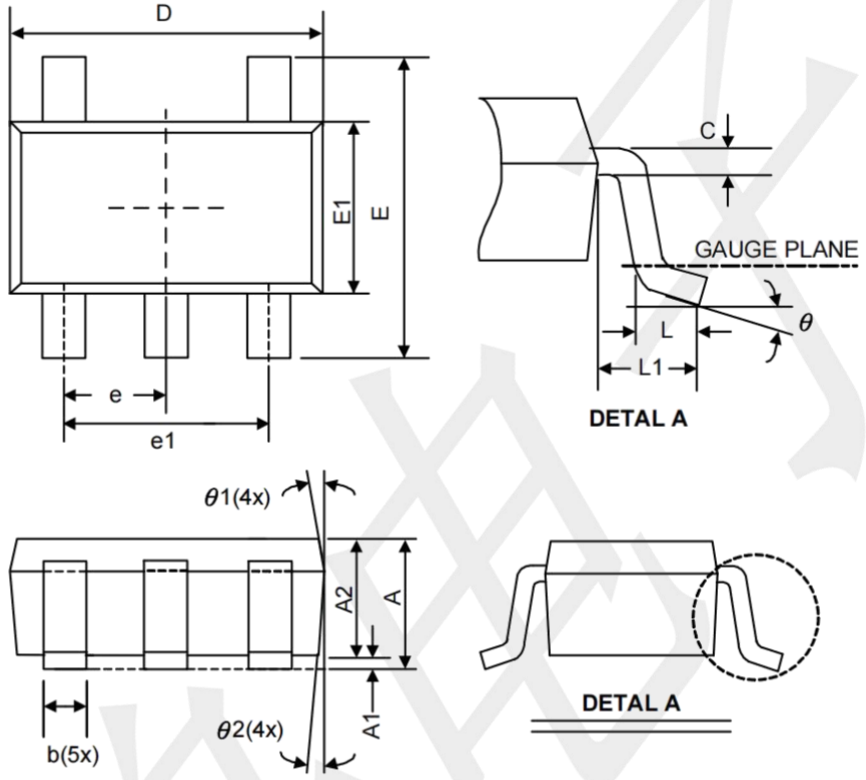


Turn-On Rising Time vs. Junction Temperature



Package informantion

SOT23-5L



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.45	-	-	0.057
A1	0	0.08	0.15	0	0.003	0.006
A2	0.9	1.1	1.3	0.035	0.043	0.051
b	0.3	0.4	0.5	0.012	0.016	0.02
C	0.08	0.15	0.22	0.003	0.006	0.009
D	2.7	2.9	3.1	0.106	0.114	0.122
E1	1.4	1.6	1.8	0.055	0.063	0.071
E	2.6	2.8	3	0.102	0.11	0.118
L	0.3	0.45	0.6	0.012	0.018	0.024
L1	0.5	0.6	0.7	0.02	0.024	0.028
e1	1.9 BSC			0.075 BSC		
e	0.95 BSC			0.037 BSC		
θ	0°	4°	8°	0°	4°	8°
θ 1	5°	10°	15°	5°	10°	15°
θ 2	5°	10°	15°	5°	10°	15°

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