



2A Current-Limited Power Distribution Switches

General Description

The EM5203J/AJ is an N-channel MOSFET high-side power switch without parasitic body diode between drain and source. The EM5203J/AJ provides very low on-resistance as 60mΩ and continuously delivers up to 2.1A output current. The fault flag output function indicates fault conditions to the local USB controller. The other features include soft start, current limit protection, Power-On-Reset function, and over temperature protection. The EM5203J/AJ is available in SOT23-5L package.

Ordering Information

Part Number	Package	Remark
EM5203AJ-20	SOT23-5	2A/Active High
EM5203J-20	SOT23-5	2A/Active Low

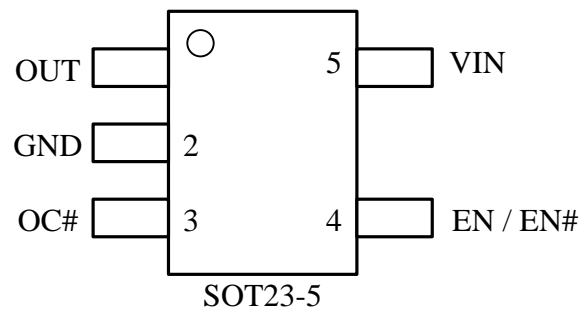
Features

- Wide Input Range 2.5V to 5.5V
- Low MOSFET On Resistance(60mΩ)
- 2us Short Protection Response
- Low Quiescent(65uA) & Shutdown Current
- Deglitched Open-Drain Fault Flag Output
- Reverse Current Flow blocking
- Power On Reset Function
- Current Limit Protection
- Over Temperature Protection
- Soft Start and Fast turn off
- Reverse Voltage Protection
- Enable Active High or Active Low
- UL Recognized, File No.E468218

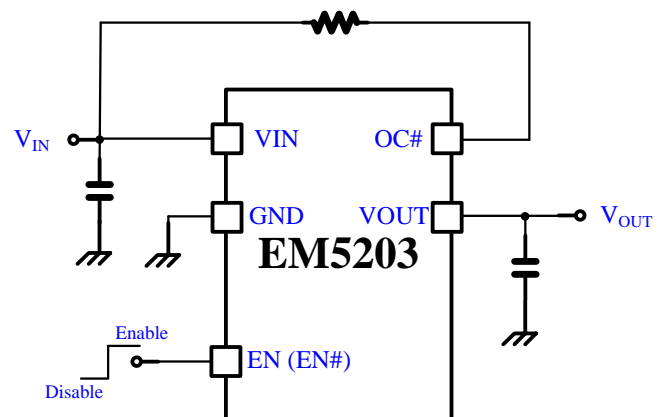
Applications

- USB
- Notebook & Netbook &MB

Pin Configuration



Typical Application Circuit

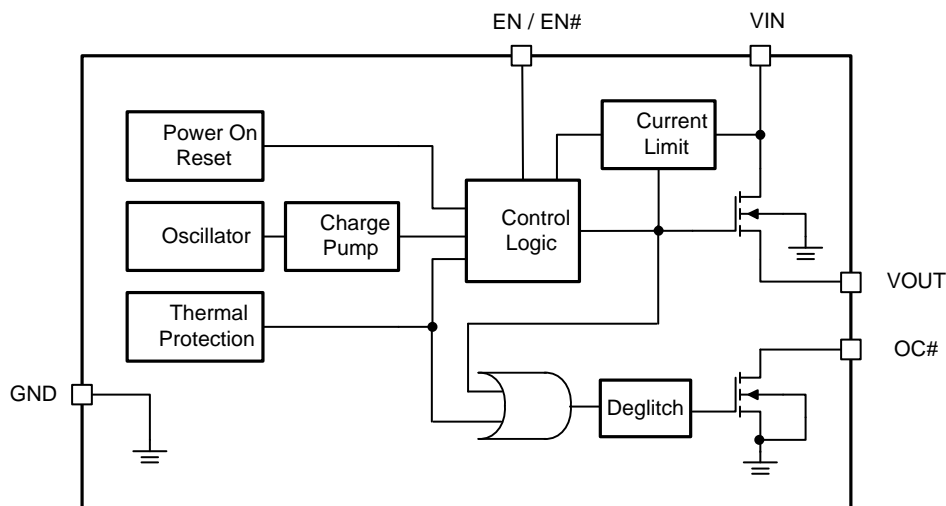


Note: A low ESR 150uF capacitor between VOUT & GND is recommended.

Pin Assignment

Pin Name	Pin No.	Pin Function
GND	2	Ground.
VIN	5	Input Voltage. This is the drain input to the power device that supplies current to the output pin. Minimum 1uF low ESR ceramic capacitor is recommended at this pin.
EN / EN#	4	Chip Enable Input (Active high for EN, Active low for EN#)
OC#	3	OC Flag Output. This is an open-drain output and is set low impedance once current limit or over temperature protection enabled.
VOUT	1	Output Voltage. VOUT is power output pin.

Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} ----- -0.3V to +6.0V
- Other Pins----- -0.3V to ($V_{IN}+0.3V$)
- Power Dissipation, P_D @ $T_A = 25^\circ C$, SOT23-5 ----- 0.4W
- Package Thermal Resistance, θ_{JA} , SOT23-5 (Note 2)----- 250°C/W
- Junction Temperature----- 150°C
- Lead Temperature (Soldering, 10 sec.)----- 260°C
- Storage Temperature ----- -65°C to 150°C
- ESD susceptibility (Note3)
 - HBM (Human Body Mode)----- 2KV
 - MM (Machine Mode)----- 200V

Recommended Operating Conditions (Note4)

- Supply Input Voltage, V_{IN} ----- +2.5V to +5.5V
- Junction Temperature ----- -40°C to 125°C
- Ambient Temperature ----- 0°C to 85°C

Electrical Characteristics

$V_{IN}=5V$, $T_A=25^{\circ}C$, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Input Section						
POR Threshold	V_{PORTH}		-	2.2	2.5	V
Quiescent Current	I_Q	$I_{OUT}=0A$	-	65	95	μA
Shutdown Current	I_{SD}	$EN\#=5V$	-	0.1	1	μA
Output Voltage						
On Resistance	R_{ON}	$I_{OUT}=0.5A$	-	60	80	$m\Omega$
Reverse Leakage Current	I_{REV}	$V_{OUT}=5V, V_{IN}=0V$	-	0.1	2	μA
Soft-Start Time		Rising from 10% to 90% $C_L=1\mu F; R_{LOAD}=10\Omega$	-	1.5	2	ms
Enable						
Enable High Level	V_{EN}		1.2	-	-	V
Disable Low Level	V_{SD}		-	-	0.5	V
EN Input Current	I_{EN}		-	0.1	1	μA
OC# Flag Output						
OC# Output Resistance	R_{FLGB}	$I_{SINK}=1mA$	-	20	80	Ω
OC# Off Current	I_{FLGB_OFF}	$V_{FLGB}=5V$	-	0.1	1	μA
OC# Delay Time	T_D		8	15	22	ms
OUT Shutdown Discharge Resistance	R_{DIS}			100		Ω
Protection						
OCP Threshold Level	I_{OCP}		2.4	3.2	-	A
Output Short Circuit Current	I_{SC}		1.2	1.7	-	A
Thermal Shutdown Temperature	T_{SD}		-	160	-	$^{\circ}C$
Thermal Shutdown Hysteresis	T_{SDHYS}		-	30	-	$^{\circ}C$

Note 1. Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2. θ_{JA} is measured in the natural convection at $T_A=25^{\circ}C$ on a low effective thermal conductivity test board (Single layout, 1S) of JEDEC 51-3 thermal measurement standard.

Note 3. Devices are ESD sensitive. Handling precaution is recommended.

Note 4. The device is not guaranteed to function outside its operating conditions.

Typical Operating Characteristics

Turn on from VIN#

CH1: VIN, CH2:Vo, CH3:OC#



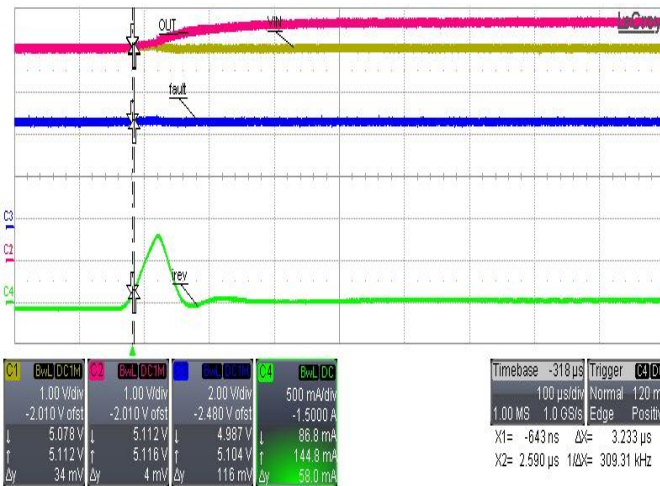
Turn off from VIN#

CH1: VIN, CH2:Vo, CH3:OC#



Reverse Voltage Protection

CH1:VIN, CH2:Vo, CH3: OC#, CH4:IREV



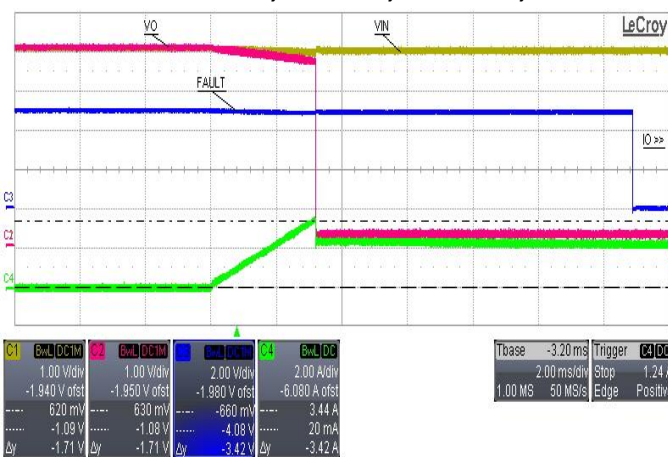
Short then power on into OT cycle

CH1:VIN, CH2:Vo, CH3:OC#



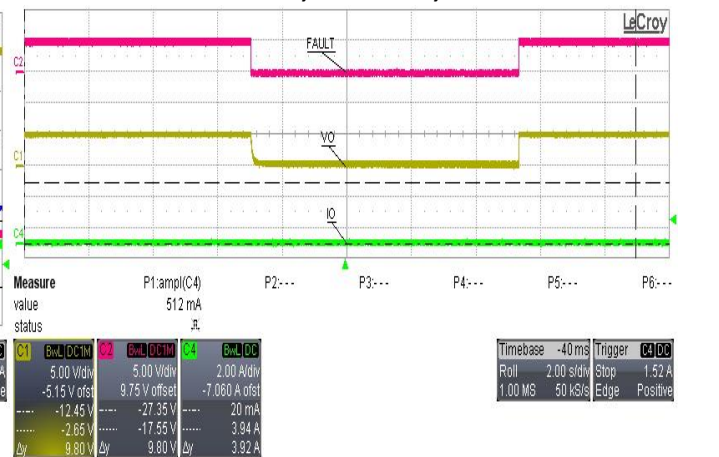
Fault Signal delay time

CH1:VIN, CH2:Vo, CH3:OC#,CH4:I_o



Fault Signal during OTP occurs

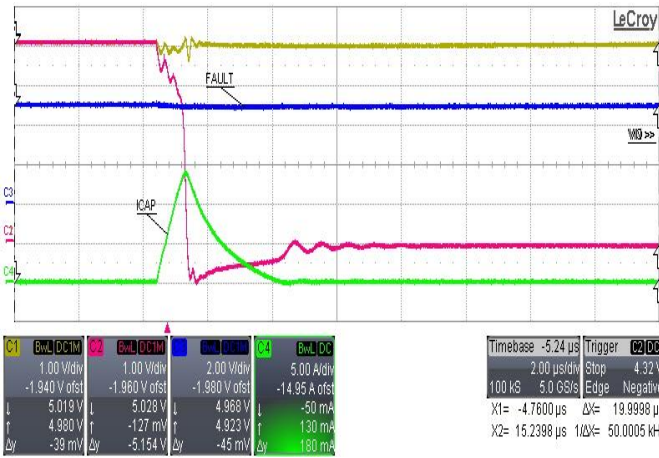
CH1:Vo, CH2:OC#, CH4:I_o



Typical Operating Characteristics

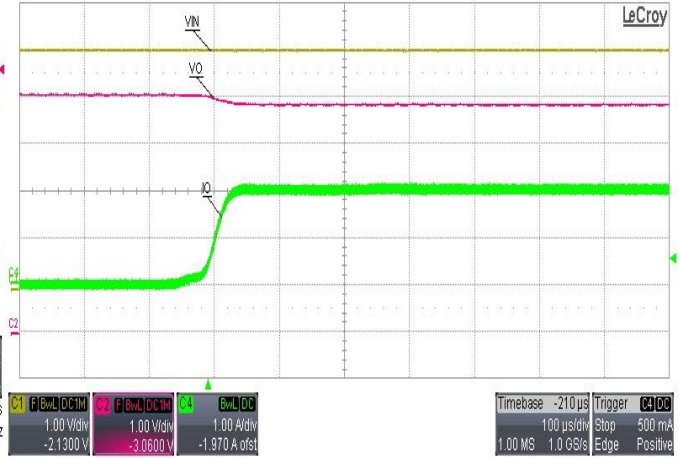
2uS Response for Output short Protection

CH1:VIN, CH2:Vo, CH3:OC#, CH4: IO

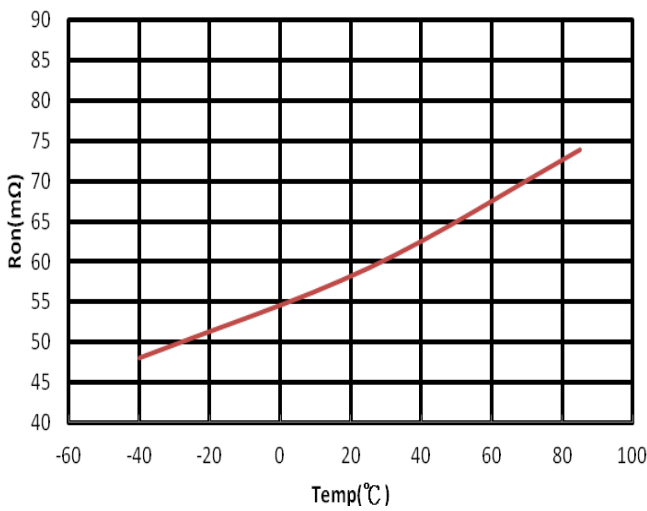


Normal operating 2A output current

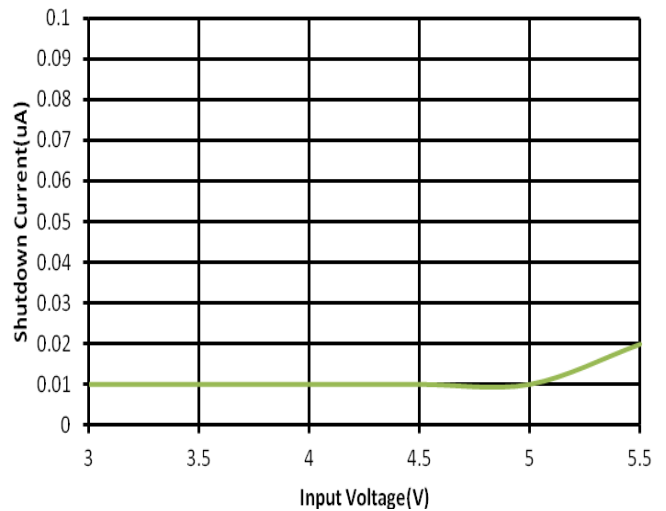
CH1:Vo, CH2:Fault, CH4:Io



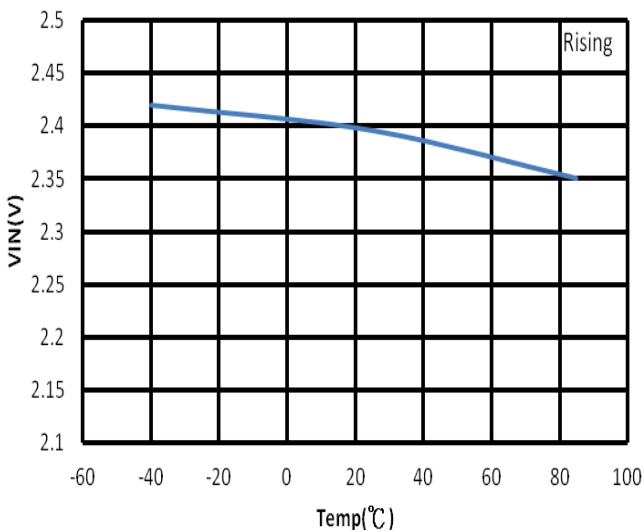
RON Performance VS Temperature



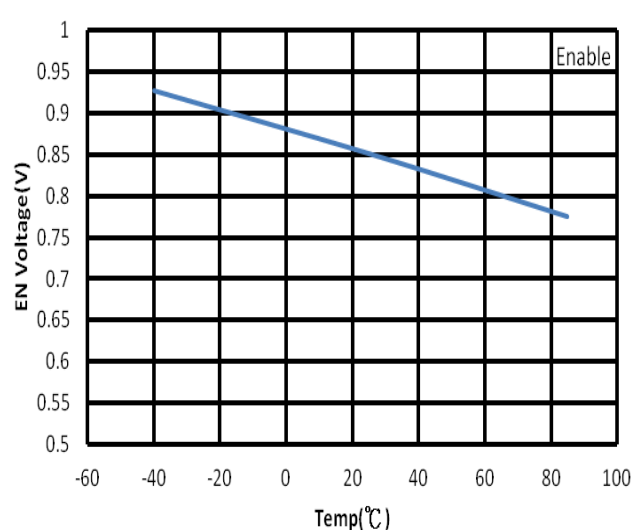
Shutdown current VS Input Voltage



UVLO ON Voltage VS Temperature

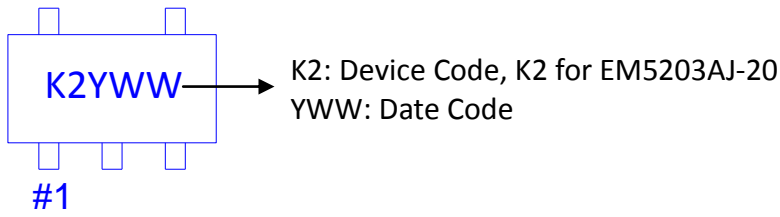


Enable Voltage VS Temperature

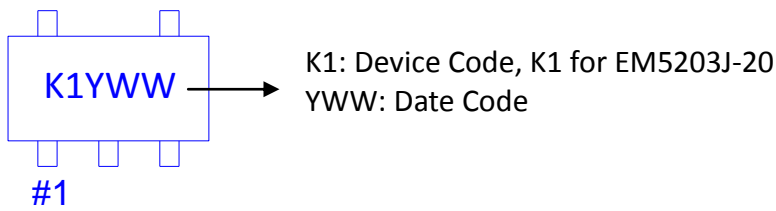


Ordering & Marking Information

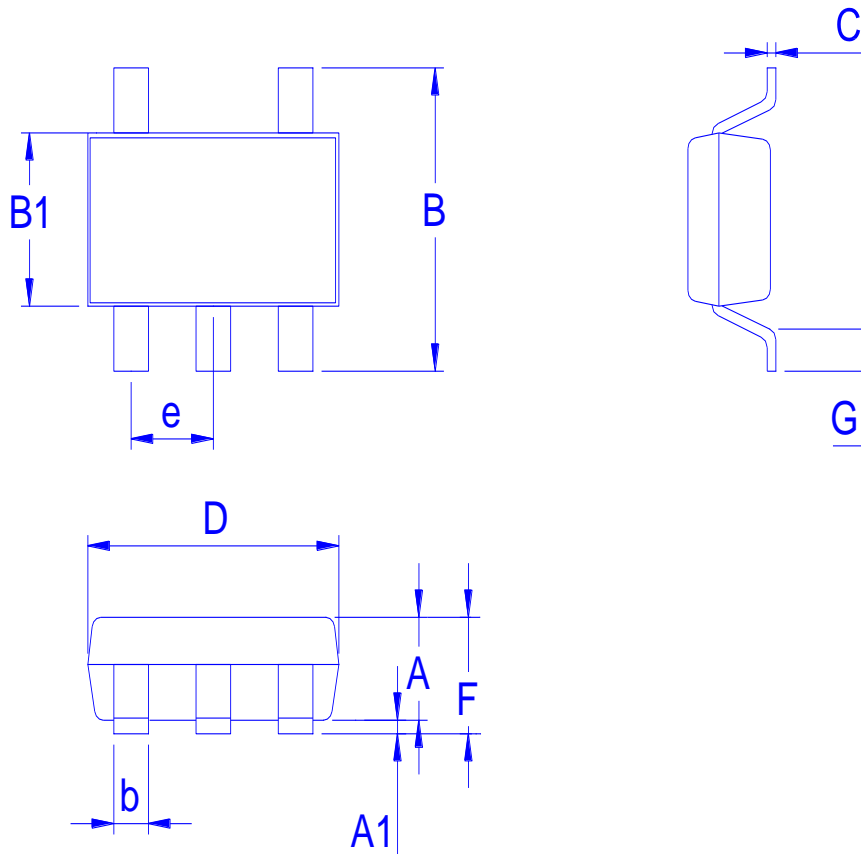
Device Name: EM5203AJ-20 for SOT-23-5



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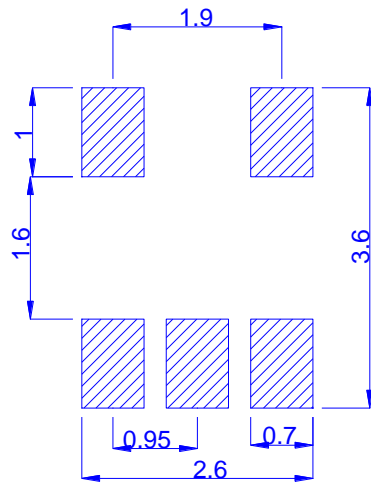


Outline Drawing



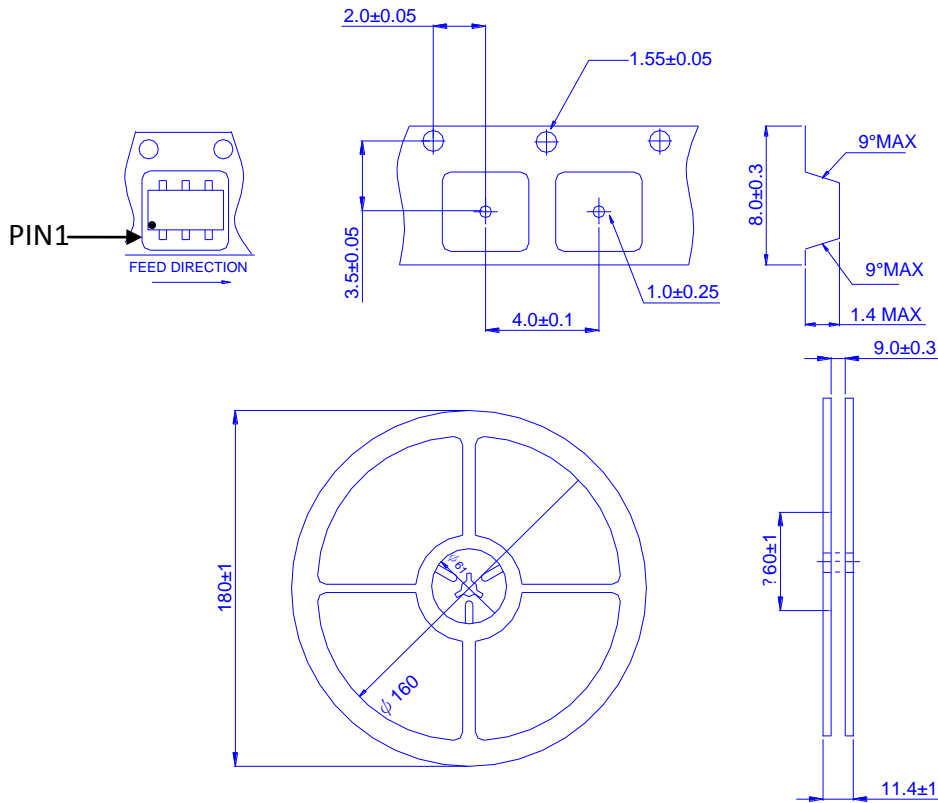
Dimension in mm

Dimension	A	A1	B	B1	b	C	D	e	F	G
Min.	0.9	0	2.6	1.5	0.3	0.08	2.8	0.87	1	0.3
Typ.	1.1	0.04	2.8	1.6	0.4	0.127	2.9	0.95	1.225	0.45
Max.	1.3	0.15	3	1.726	0.5	0.22	3.026	1.03	1.45	0.6





◆ Tape & Reel Information: 3000pcs/Reel (Dimension in millimeter)



產品別	SOT-2X series
Reel 尺寸	7"
編帶方式	
前空格	50
後空格	50
裝箱數	
滿捲數量	3K
捲/內盒比	5 : 1
內盒滿箱數	15K
內/外箱比	8 : 1
外箱滿箱數	120K