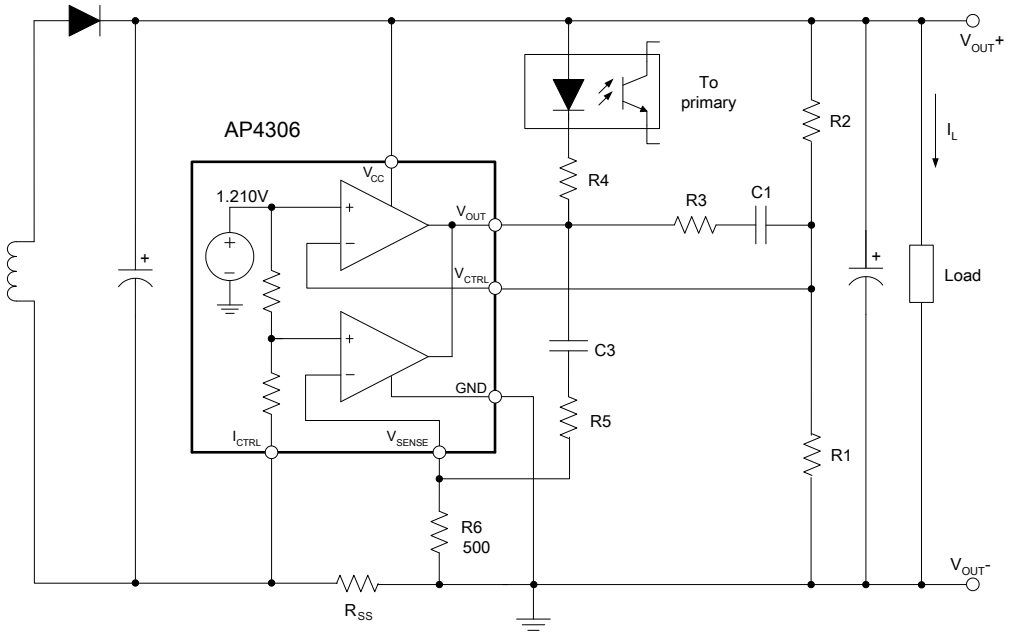
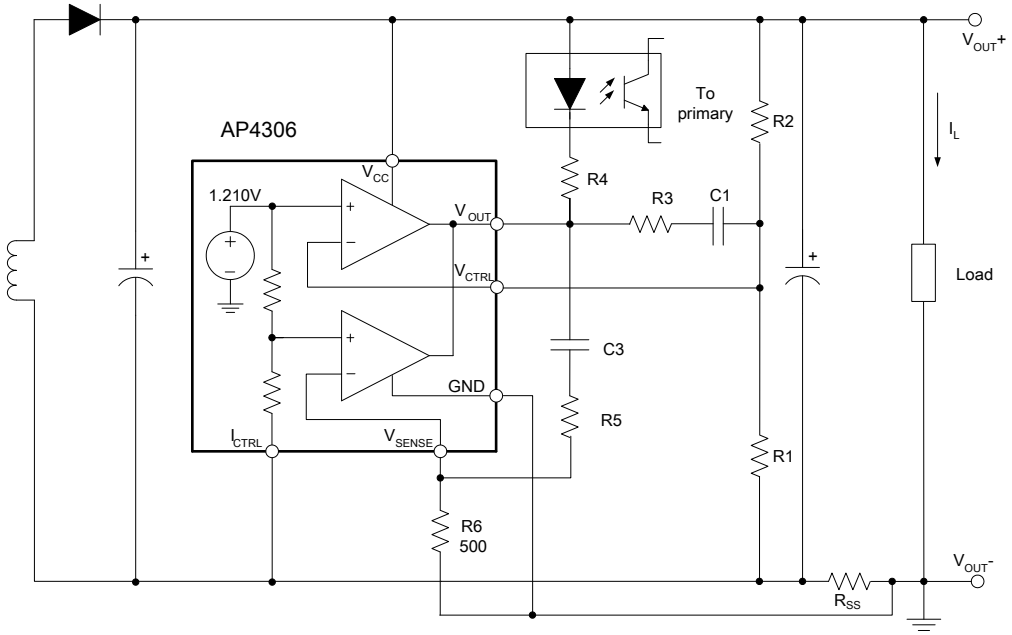
Typical Applications Circuit



$$V_{OUT} = V_{REF} \times \frac{R1 + R2}{R1}$$

$$CurrentLimit = \frac{V_{SENSE}}{R_{SS}}$$

Typical Application 1

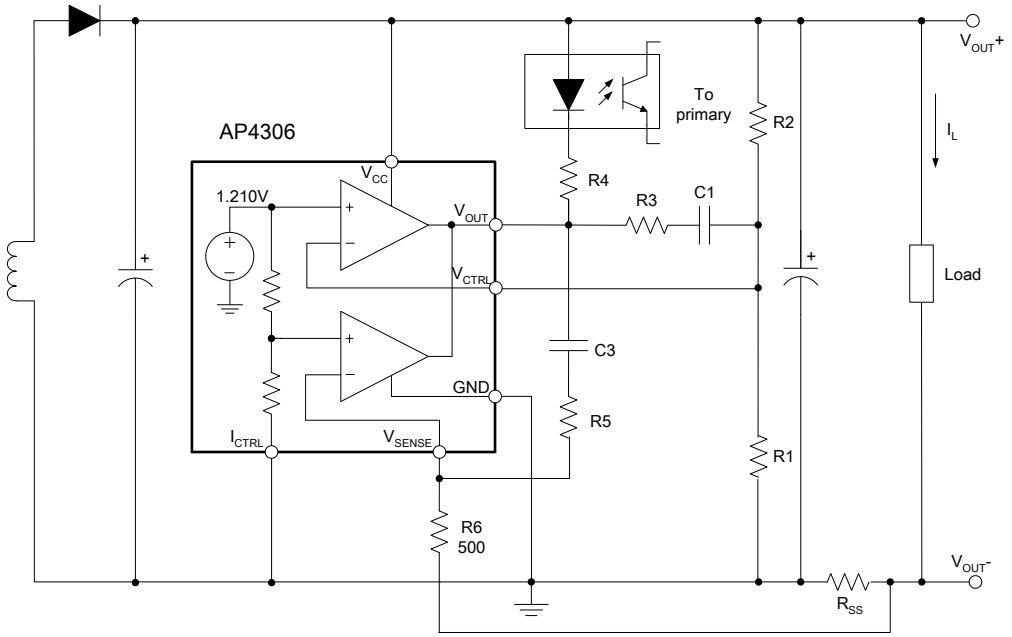


$$V_{OUT} = [V_{REF} + (I_L \times R_{SS})] \times \frac{R1 + R2}{R1} - (I_L \times R_{SS})$$

$$CurrentLimit = \frac{V_{SENSE}}{R_{SS}}$$

Typical Application 2

Typical Applications Circuit (Cont.)



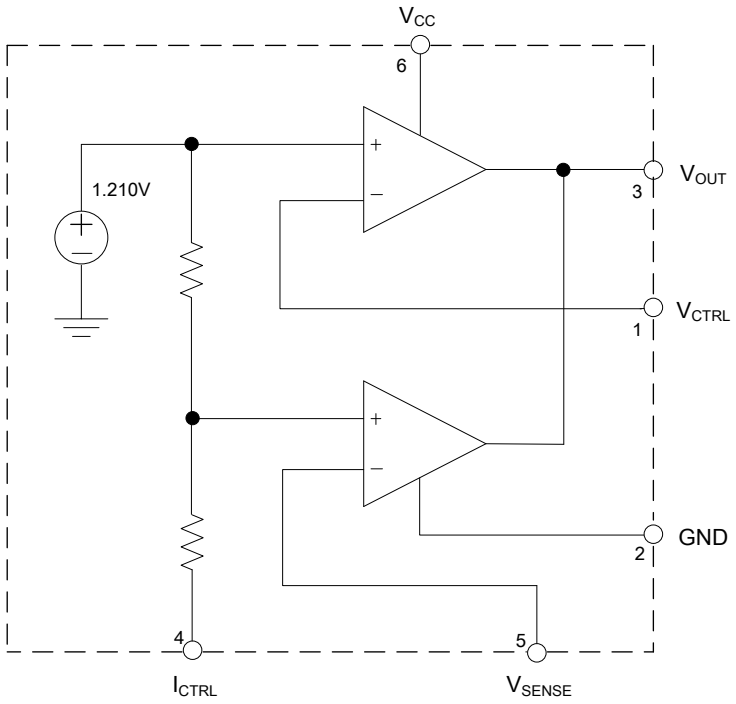
$$V_{OUT} = V_{REF} \times \frac{R1 + R2}{R1} - (I_L \times R_{SS}) \qquad CurrentLimit = \frac{V_{SENSE} \times V_{REF}}{(V_{SENSE} + V_{REF}) \times R_{SS}}$$

Typical Application 3

Pin Descriptions

Pin Number	Pin Name	Function
1	V_{CTRL}	Input pin of the voltage control loop
2	GND	Ground
3	V_{OUT}	Output pin. Sinking current only
4	I_{CTRL}	Input pin of the current control loop
5	V_{SENSE}	Input pin of the current control loop
6	V_{CC}	Power supply

Functional Block Diagram



For A, B, C Versions

Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating	Unit
V_{CC}	Power Supply Voltage	20	V
V_{IN}	Input Voltage	-0.3 to V_{CC}	V
T_J	Junction Temperature	+150	°C
T_{STG}	Storage Temperature	-65 to +150	°C
T_{LEAD}	Lead Temperature (Soldering, 5sec)	+260	°C
θ_{JA}	Thermal Resistance (Junction to Ambient)	250	°C/W

Note 4: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Power Supply Voltage	2.5	18	V
T_A	Operating Temperature Range	-40	+105	°C

Electrical Characteristics (@V_{CC}=5V, T_A=+25°C, unless otherwise specified.)

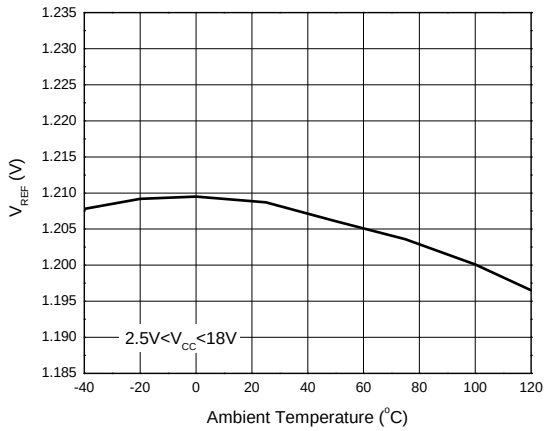
Symbol	Parameters	Conditions		Min	Typ	Max	Unit
TOTAL CURRENT CONSUMPTION							
I_{CC}	Total Supply Current Not Including the Output Sinking	T_A=25°C		–	0.5	1	mA
		-40°C<T_A <+105°C		–	0.6	–	
VOLTAGE CONTROL LOOP							
Gmv	Transconduction Gain (V_{CTRL}). Sink Current Only	T_A=25°C		1	3.5	–	mA/mV
		-40°C<T_A <+105°C		–	2.5	–	
V_{REF}	Voltage Control Loop Reference	A Version	T_A=+25°C	1.198	1.21	1.222	V
			-40°C<T_A <+105°C	1.162		1.258	
		B, C Versions	T_A=+25°C	1.204	1.21	1.216	
			-40°C<T_A <+105°C	1.186	–	1.234	
I_{IBV}	Input Bias Current (V_{CTRL})	T_A=+25°C		–	50	–	nA
		-40°C<T_A <+105°C		–	100	–	
CURRENT CONTROL LOOP							
Gmi	Transconduction Gain (I_{CTRL}). Sink Current Only	T_A=+25°C		1.5	7	–	mA/mV
		-40°C<T_A <+105°C		1.5	7	–	
V_{SENSE}	Current Control Loop Reference	A Version	T_A=+25°C	66.5	70	73.5	mV
			-40°C<T_A <+105°C	63		77	
		B Version	T_A=+25°C	97	100	103	
			-40°C<T_A <+105°C	94		106	
		C Version	T_A=+25°C	147	150	153	
			-40°C<T_A <+105°C	143		157	
I_{IBI}	Current Out of Pin I_{CTRL} at V_{SENSE}	A Version	T_A=+25°C	–	18	–	µA
			-40°C<T_A <+105°C	–	35	–	
		B Version	T_A=+25°C	–	25	–	
			-40°C<T_A <+105°C	–	50	–	
		C Version	T_A=+25°C	–	37.5	–	
			-40°C<T_A <+105°C	–	75	–	
OUTPUT STAGE							
V_{OL}	Low Output Voltage at 10mA Sinking Current	T_A=+25°C		–	100	–	mV
		-40°C<T_A <+105°C		–	100	–	
I_{OS}	Output Short Circuit Current. Output to V_{CC}. Sink Current Only	T_A=+25°C		–	27	50	mA
		-40°C<T_A <+105°C		–	35	–	

Thermal Impedance

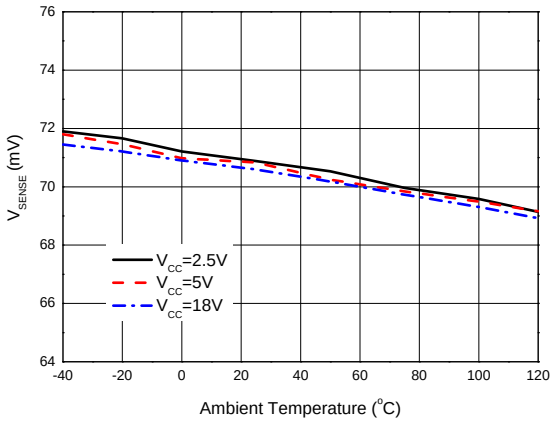
Symbol	Parameters	Value	Unit
θ_{JC}	Thermal Resistance (Junction to Case)	84	°C/W

Performance Characteristics

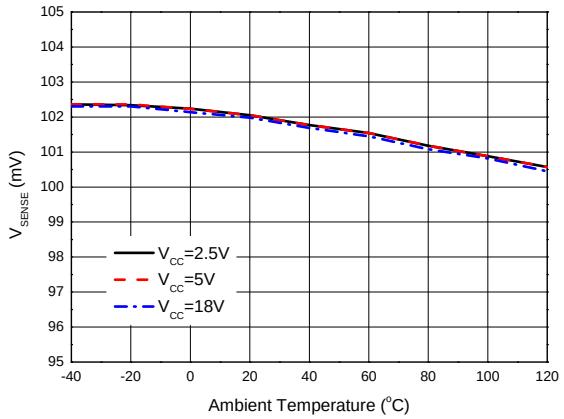
AP4306 V_{REF} vs. Ambient Temperature



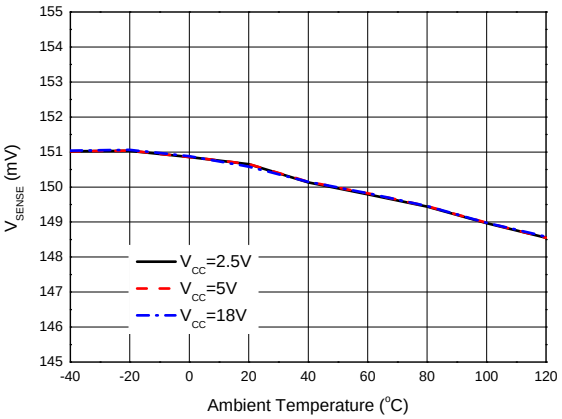
AP4306A V_{SENSE} vs. Ambient Temperature



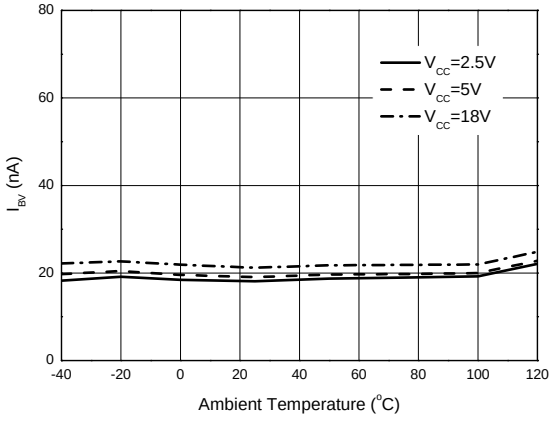
AP4306B V_{SENSE} vs. Ambient Temperature



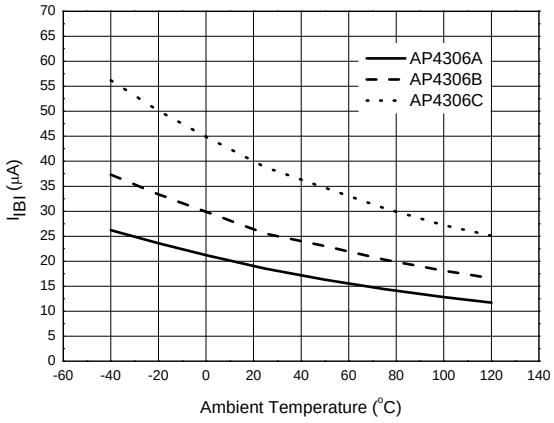
AP4306C V_{SENSE} vs. Ambient Temperature



AP4306 I_{IBV} vs. Ambient Temperature

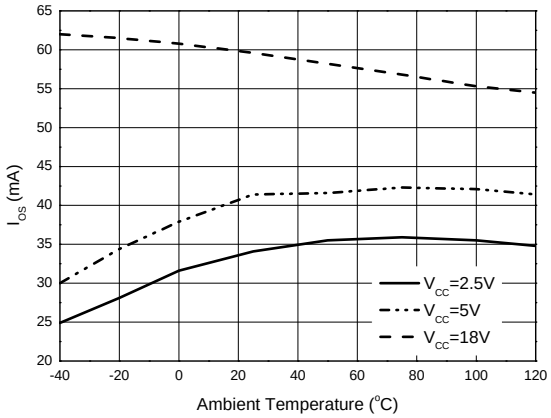


AP4306 I_{IBI} vs. Ambient Temperature

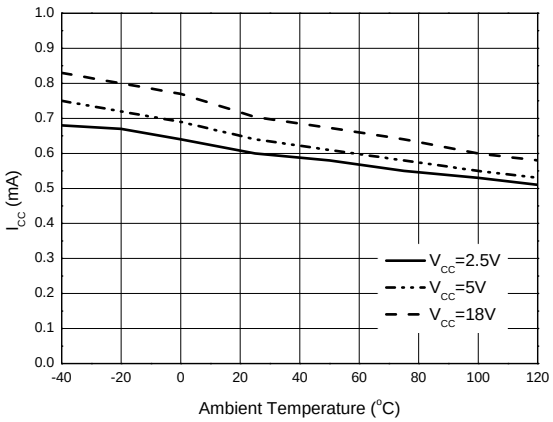


Performance Characteristics (Cont.)

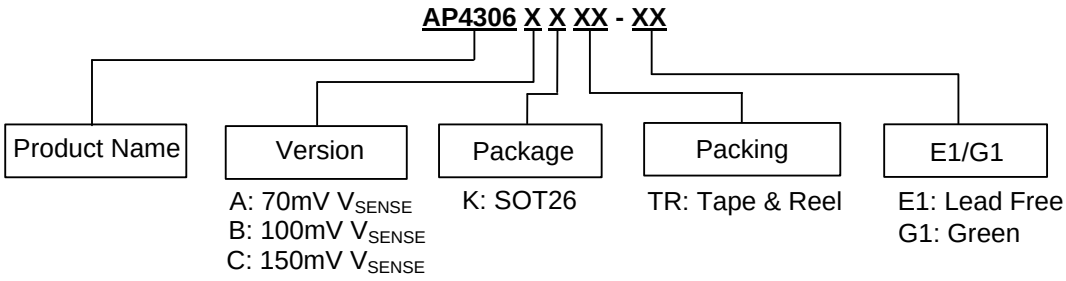
AP4306 I_{OS} vs. Ambient Temperature



AP4306 I_{CC} vs. Ambient Temperature



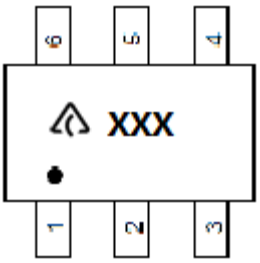
Ordering Information



Diodes IC's Pb-free products with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green package.

Package	Version	Part Number		Marking ID		Packing
		Lead Free	Green	Lead Free	Green	
SOT26	70mV V_{SENSE}	AP4306AKTR-E1	AP4306AKTR-G1	E7L	G7L	3000/Tape & Reel
	100mV V_{SENSE}	AP4306BKTR-E1	AP4306BKTR-G1	E7M	G7M	3000/Tape & Reel
	150mV V_{SENSE}	AP4306CKTR-E1	AP4306CKTR-G1	E7N	G7N	3000/Tape & Reel

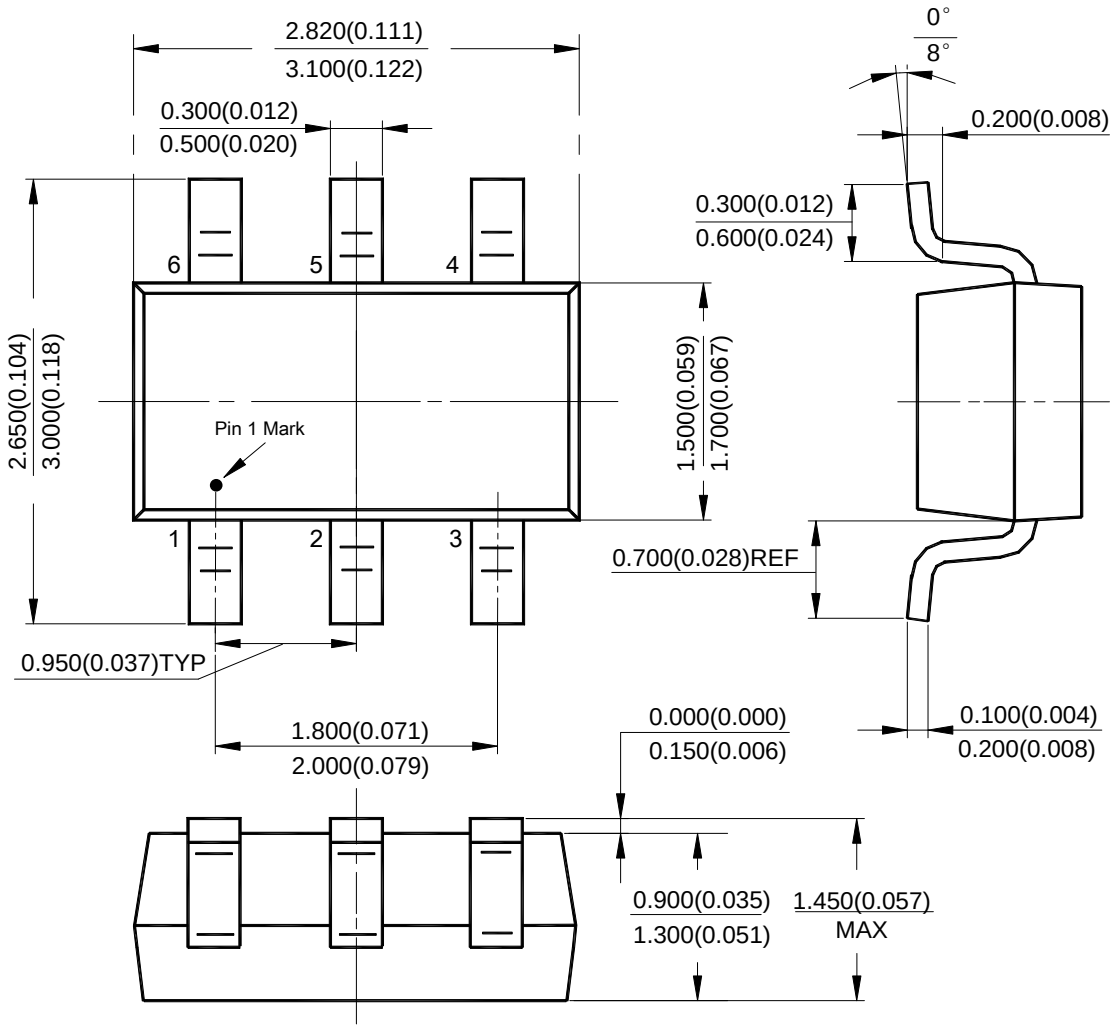
Marking Information



: Logo
XXX: Marking ID (See ordering information)

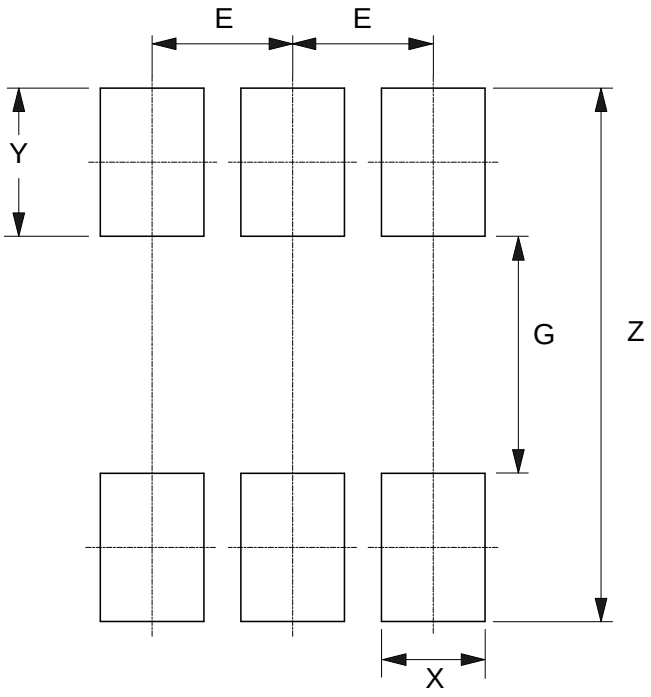
Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: SOT26



Suggested Pad Layout

(1) Package Type: SOT26



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	3.600/0.142	1.600/0.063	0.700/0.028	1.000/0.039	0.950/0.037

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