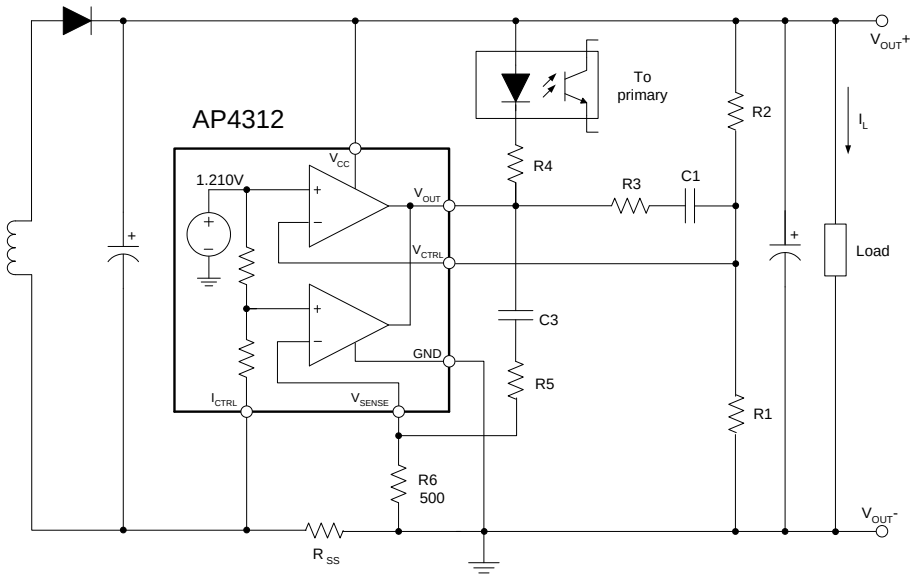
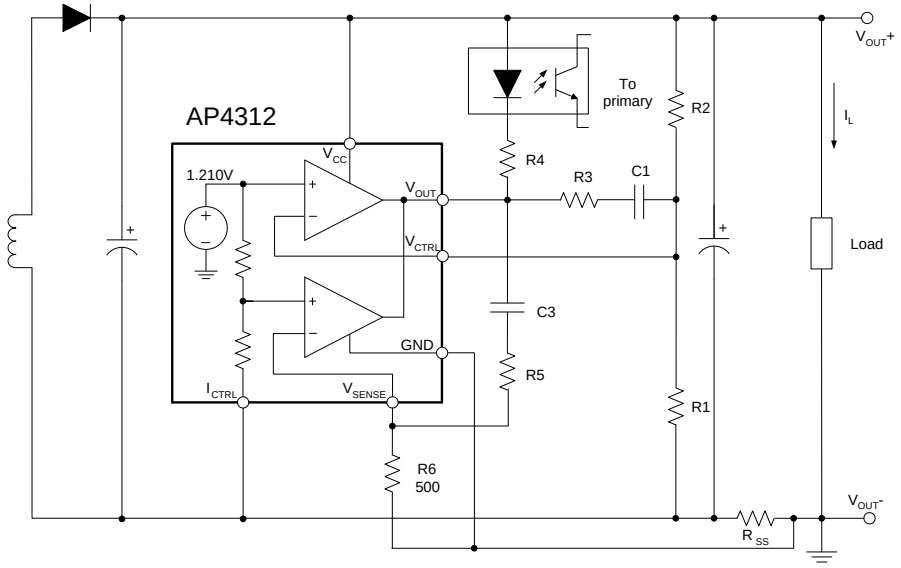
Typical Applications Circuit



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

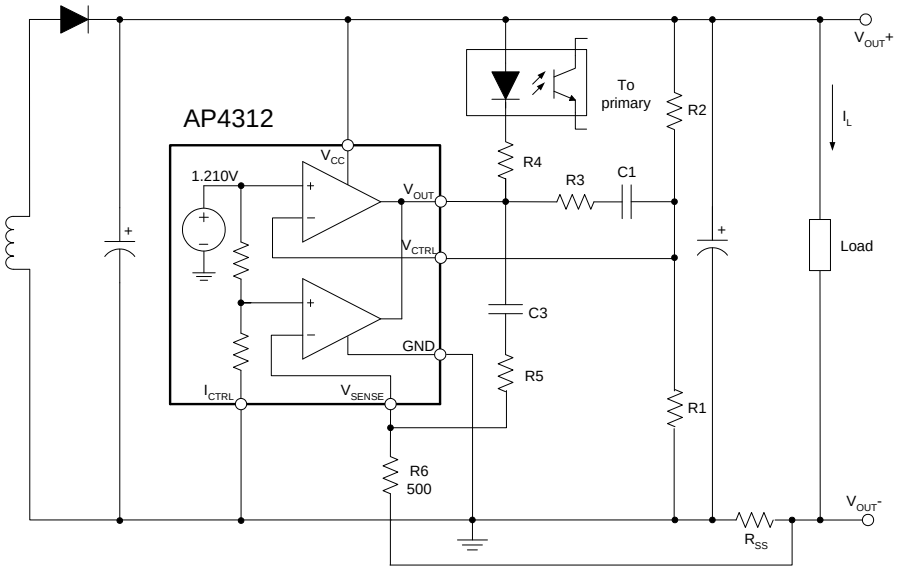
Typical Application 1



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

Typical Application 2

Typical Applications Circuit (Cont.)



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

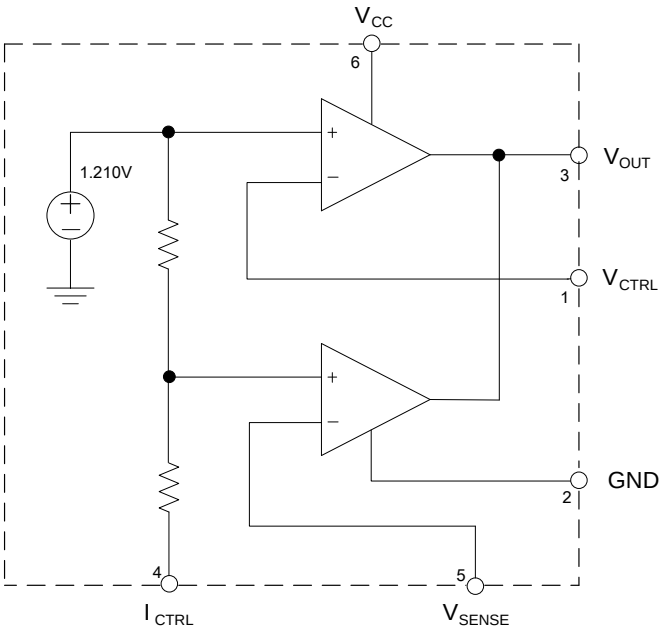
$$CurrentLimit = \frac{V_{SENSE} \times V_{REF}}{(V_{SENSE} + V_{REF}) \times R_{SS}}$$

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



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	1.7	18	V

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

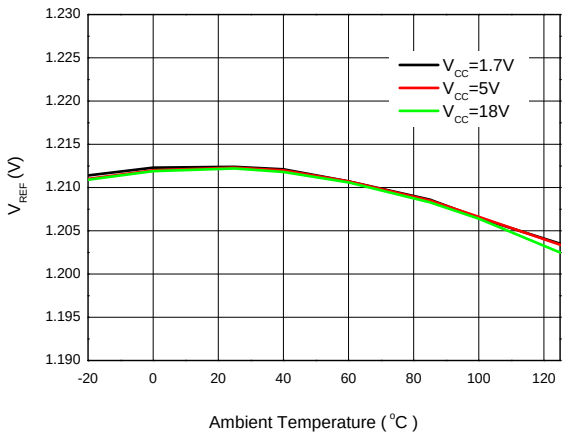
Symbol	Parameters	Conditions	Min	Typ	Max	Unit
TOTAL CURRENT CONSUMPTION						
I_{CC}	Total Supply Current Not Including the Output Sinking Current	T_A=+25°C	–	180	–	μA
		-40°C <T_A<+105°C	–	–	300	
VOLTAGE CONTROL LOOP						
Gmv	Transconductance of Voltage Control Loop Op-Amp (Sink Current Only)	T_A=+25°C	1	3.5	–	mA/mV
		-40°C <T_A<+105°C	–	2.5	–	
V_{REF}	Voltage Control Loop Reference	T_A=+25°C	1.204	1.21	1.216	V
		-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	Transconductance of Current Control Loop Op-Amp (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	T_A=+25°C	67.9	70	72.1	mV
		-40°C <T_A<+105°C	66		74	
I_{IBI}	Current Out of Pin I_{CTRL} at V_{SENSE}	T_A=+25°C	–	18	–	μA
		-40°C <T_A<+105°C	–	35	–	
OUTPUT STAGE						
V_{OL}	Low Output Voltage Level	T_A=+25°C, I_{SINK}=2mA	–	100	–	mV
		-40°C <T_A<+105°C, I_{SINK}=2mA	–	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

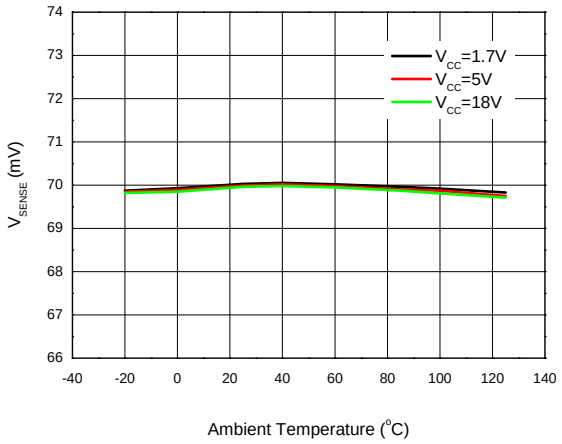
Symbol	Parameter	Value	Unit
θ_{JC}	Thermal Resistance (Junction to Case)	84	°C/W

Performance Characteristics

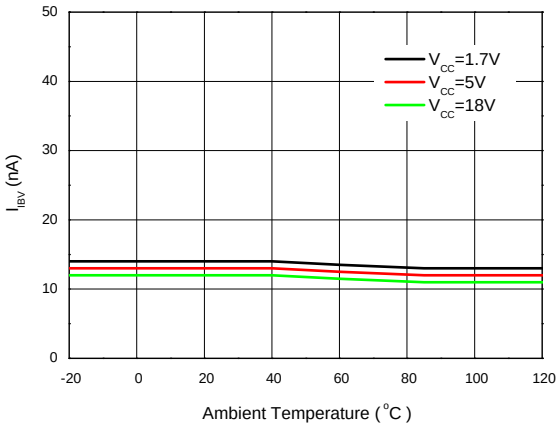
Voltage Control Loop Reference vs. Ambient Temperature



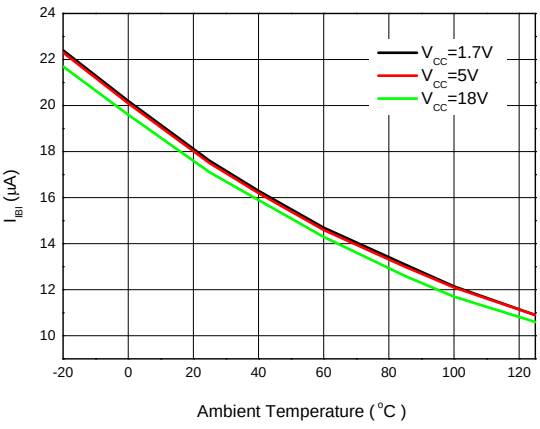
Current Control Loop Reference vs. Ambient Temperature



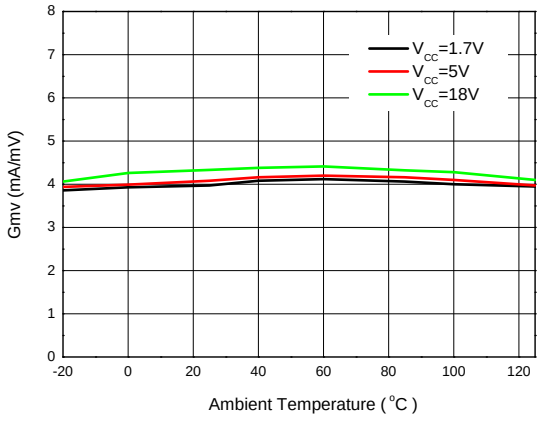
Input Bias Current (V_{CTRL}) vs. Ambient Temperature



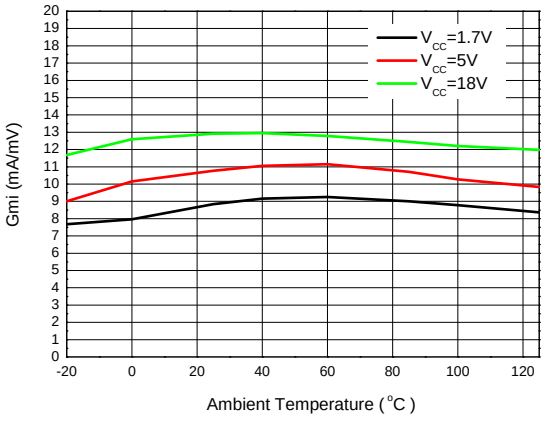
Current Out of Pin I_{CTRL} at V_{SENSE} vs. Ambient Temperature



Transconductance of Voltage Control Loop Op-Amp vs. Ambient Temperature

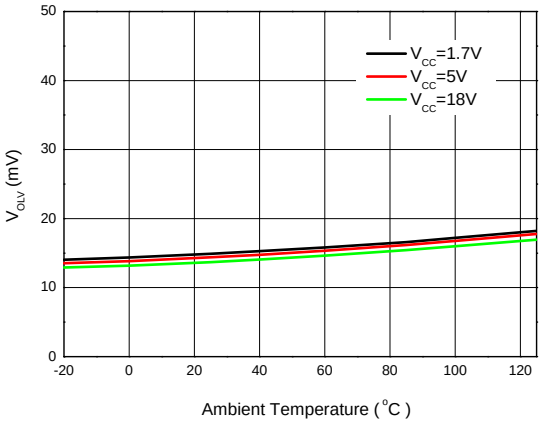


Transconductance of Current Control Loop Op-Amp vs. Ambient Temperature

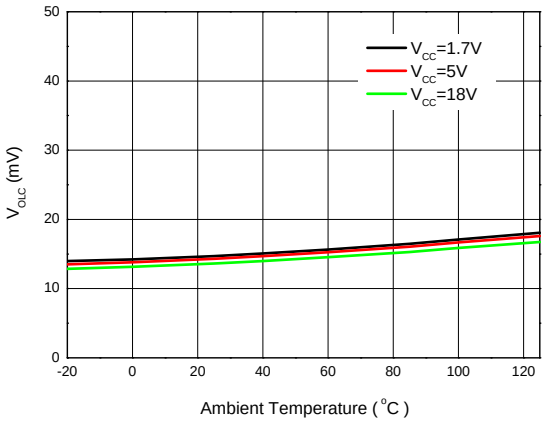


Performance Characteristics (Cont.)

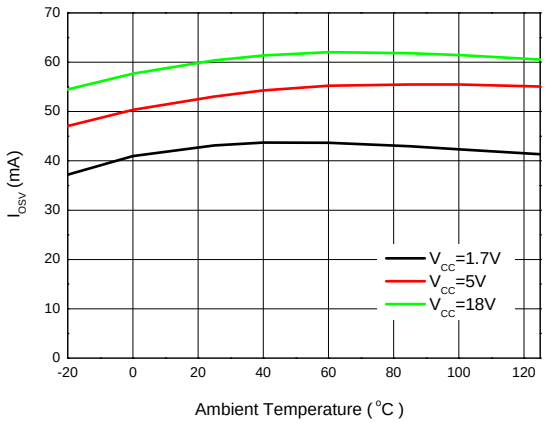
Low Output Level of Voltage Control Loop Op-Amp vs. Ambient Temperature



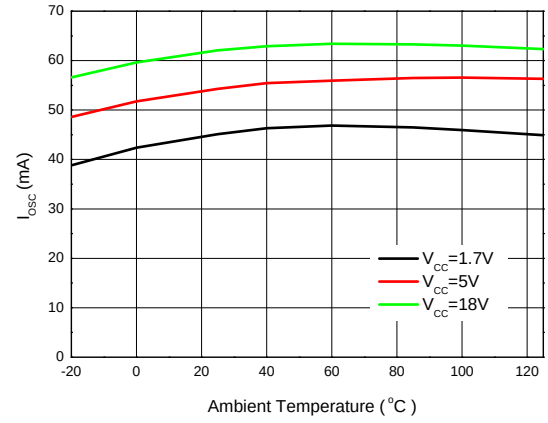
Low Output Level of Current Control Loop Op-Amp vs. Ambient Temperature



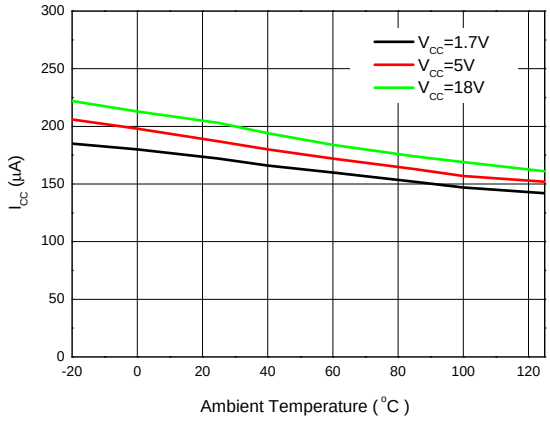
Output Short Circuit Current of Voltage Control Loop Op-Amp vs. Ambient Temperature



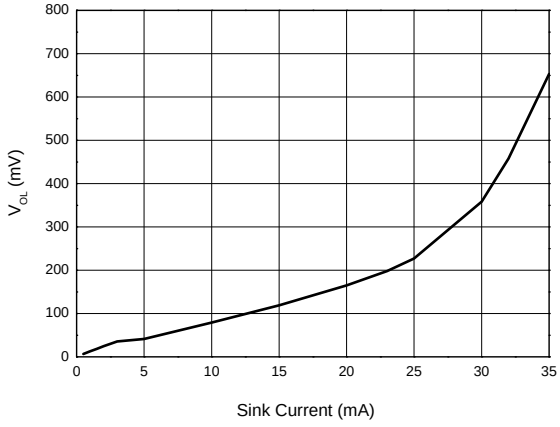
Output Short Circuit Current of Current Control Loop Op-Amp vs. Ambient Temperature



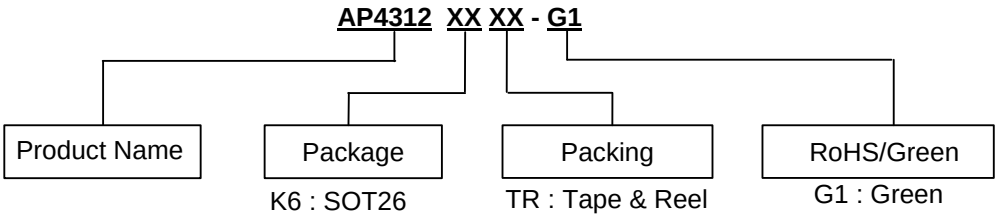
Total Supply Current Not Including the Output Sinking Current vs. Ambient Temperature



Low Output Voltage Level vs. Sink Current



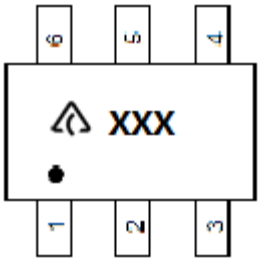
Ordering Information



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

Package	Part Number	Marking ID	Packing
SOT26	AP4312K6TR-G1	GKD	3000/Tape & Reel

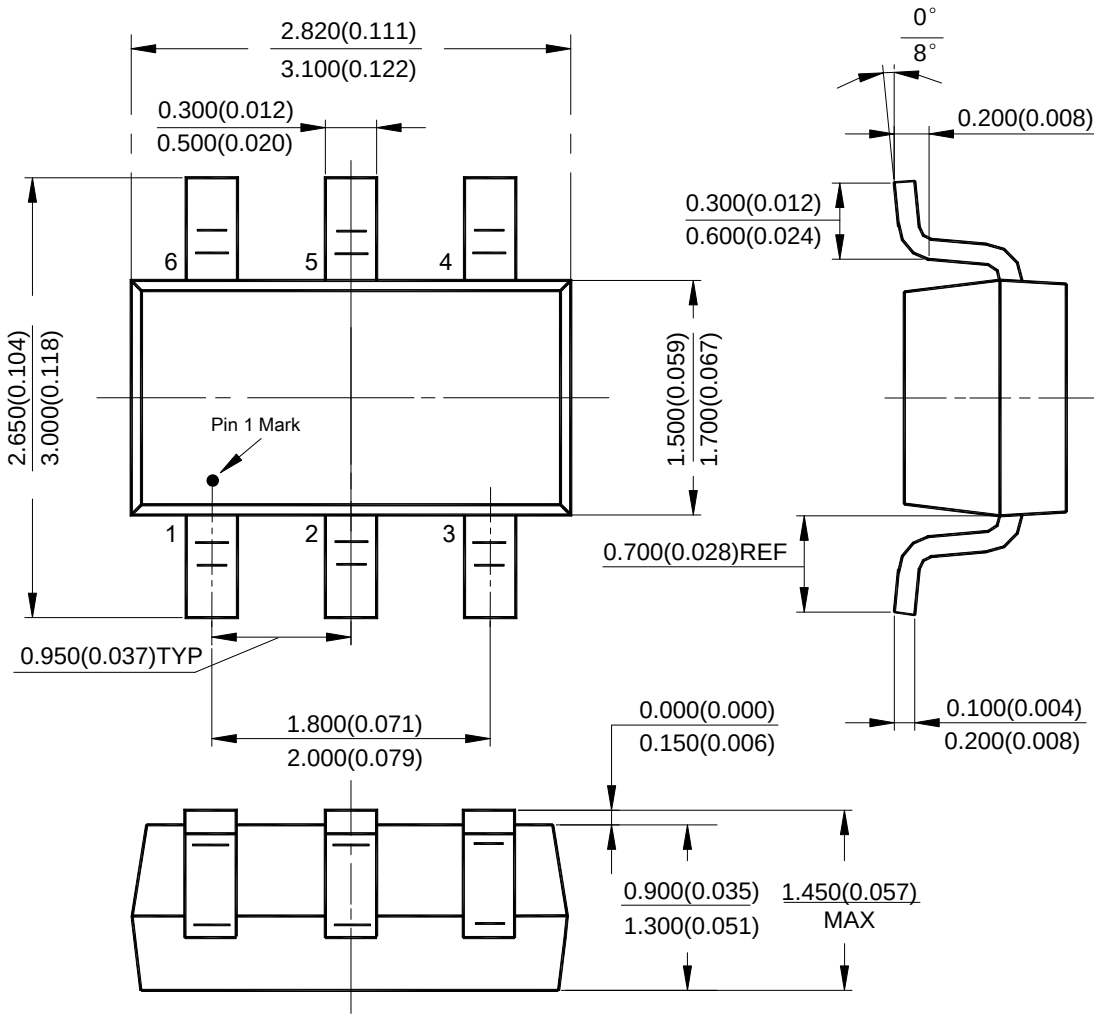
Marking Information



: Logo
XXX: Marking ID (See ordering information)

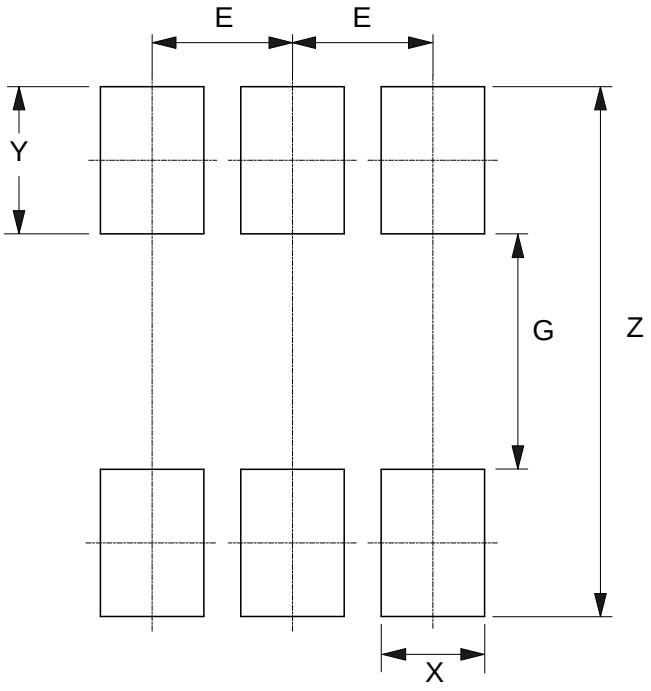
Package Outline Dimensions (All dimensions in mm(inch).)

(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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