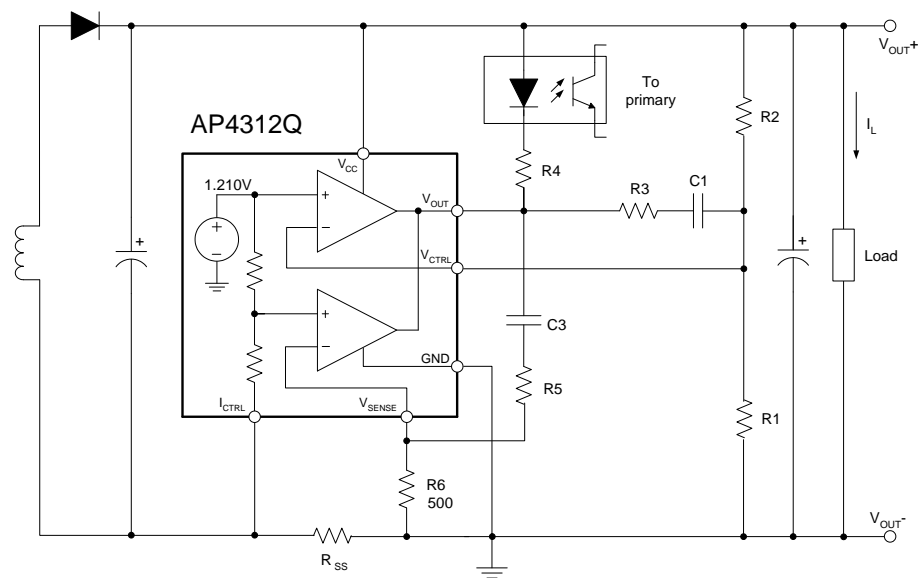


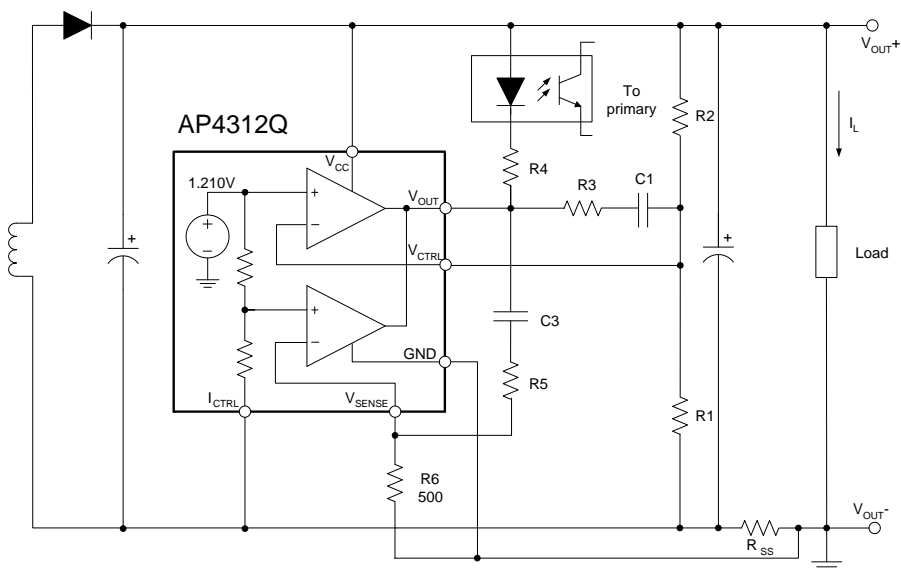
Typical Applications Circuit



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

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

Typical Application 1

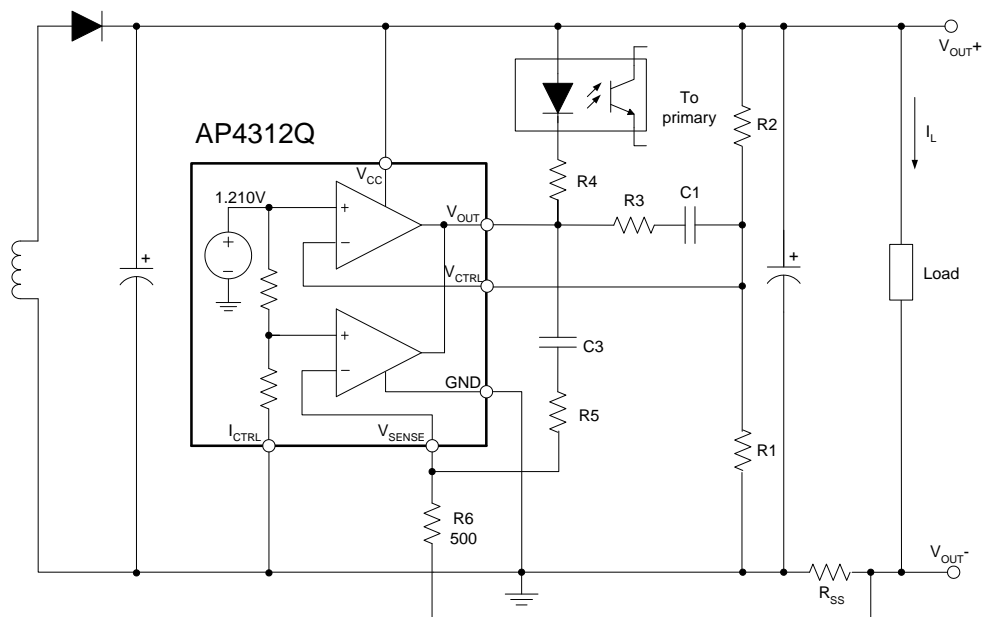


$$V_{OUT} = [V_{REF} + (I_L \times R_{SS})] \times \frac{R1 + R2}{R1} - (I_L \times R_{SS})$$

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

Typical Application 2

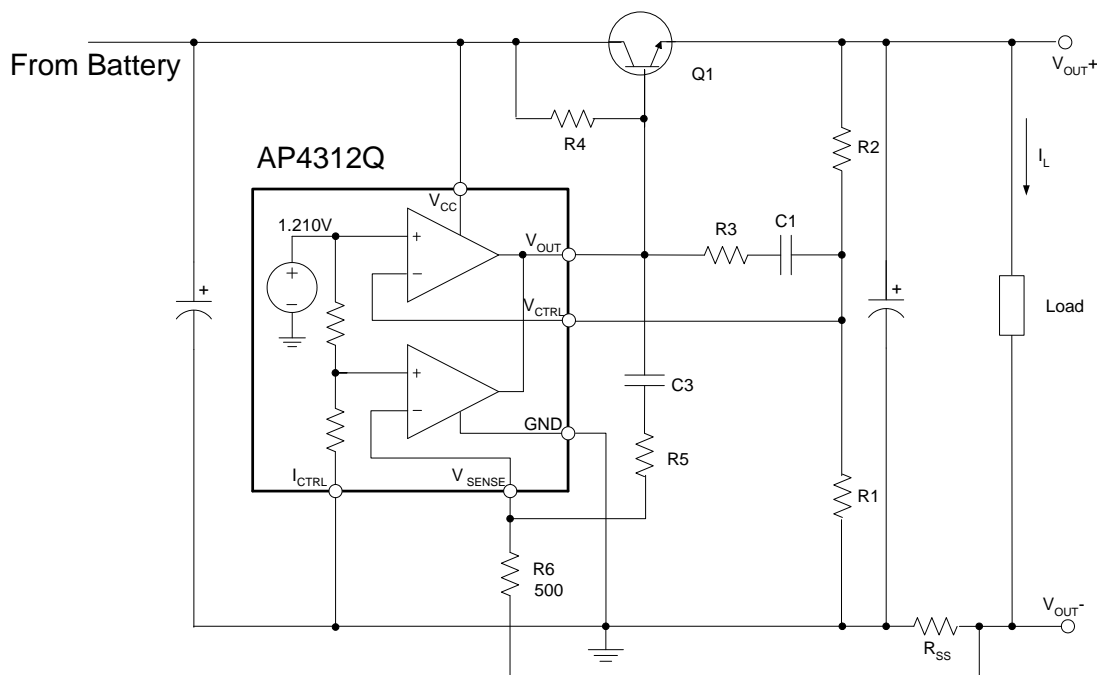
Typical Applications Circuit (Cont.)



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

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

Typical Application 3



Typical Application 4

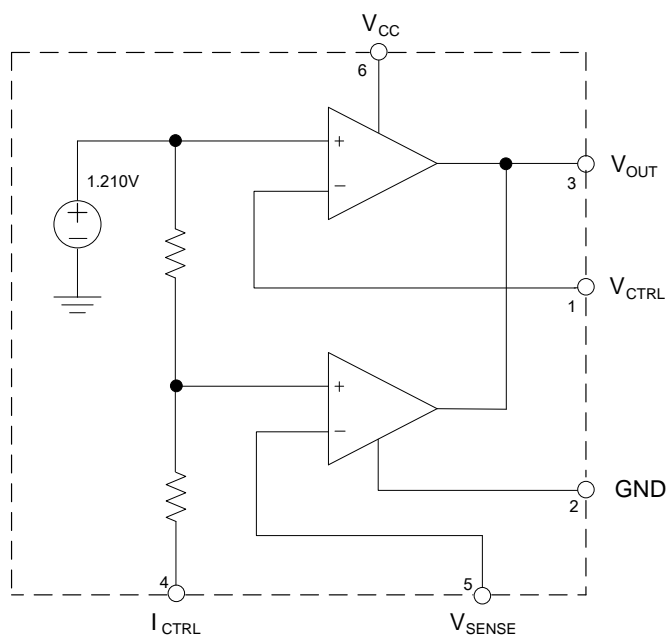
$$V_{OUT} = V_{REF} \times \frac{R1 + R2}{R1} - (I_L \times R_{SS})$$

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

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 (@ $V_{CC}=5V$, $T_A=+25^{\circ}C$, unless otherwise specified.)

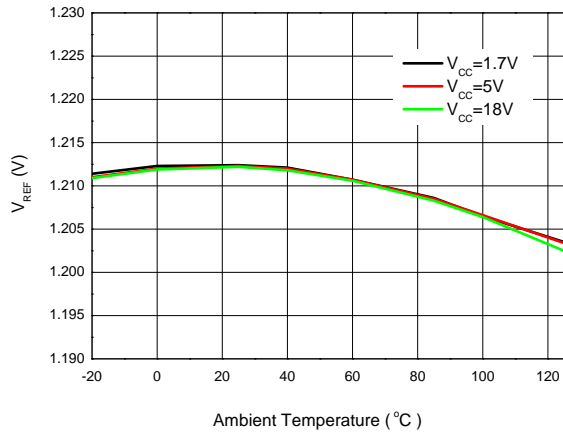
Symbol	Parameters	Conditions	Min	Typ	Max	Unit
TOTAL CURRENT CONSUMPTION						
I _{CC}	Total Supply Current Not Including the Output Sinking Current	T _A =+25°C	–	180	–	µA
		-40°C <T _A <+105°C	–	–	300	
VOLTAGE CONTROL LOOP						
G _{mv}	Transconductance of Voltage Control Loop Op-Amp (Sink Current Only)	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						
G _{mi}	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

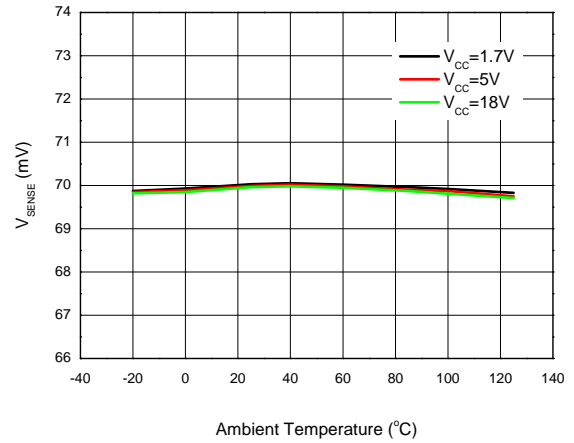
Symbol	Parameter	Value	Unit
θ_{JC}	Thermal Resistance (Junction to Case)	84	$^{\circ}C/W$

Performance Characteristics

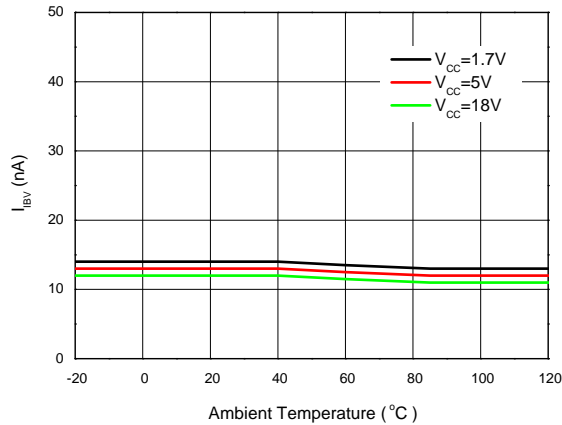
**Voltage Control Loop Reference
vs. Ambient Temperature**



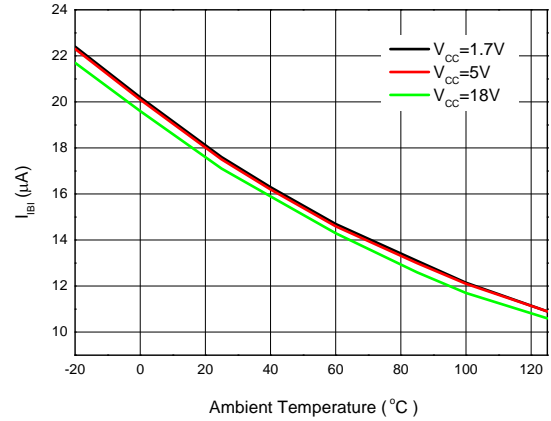
**Current Control Loop Reference
vs. Ambient Temperature**



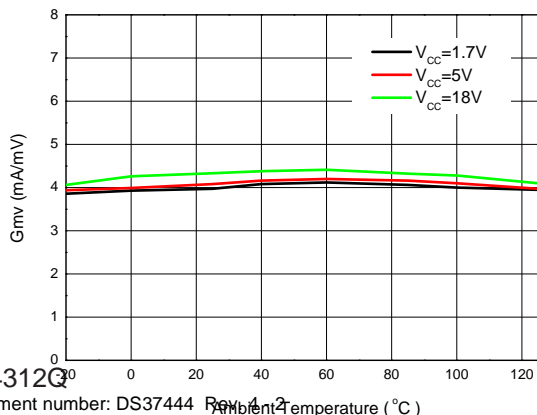
**Input Bias Current (I_{IB})
vs. Ambient Temperature**



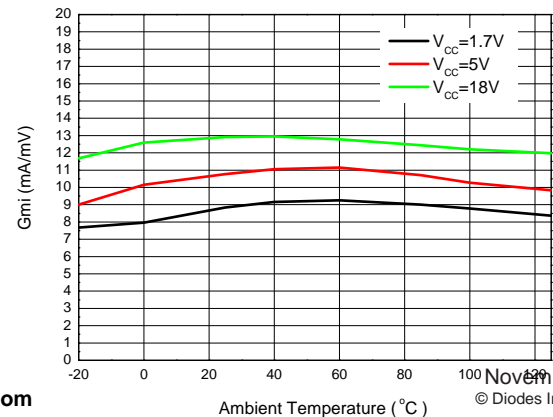
**Current Out of Pin I_{CTRL} at V_{SENSE}
vs. Ambient Temperature**



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

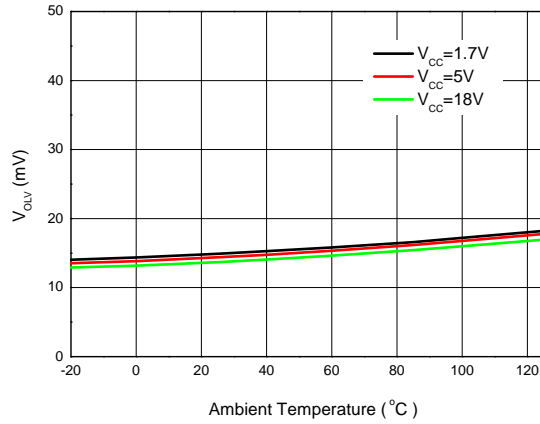


**Transconductance of Current Control Loop
Op-Amp vs. Ambient Temperature**

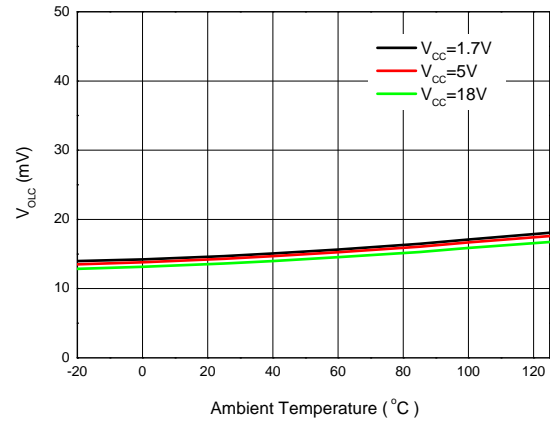


Performance Characteristics (Cont.)

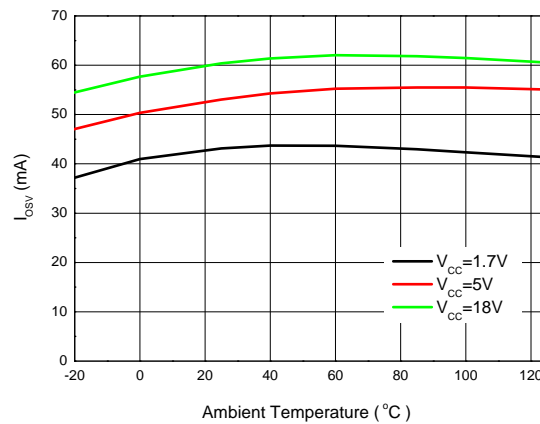
**Low Output Level of Voltage Control Loop
Op-Amp vs. Ambient Temperature**



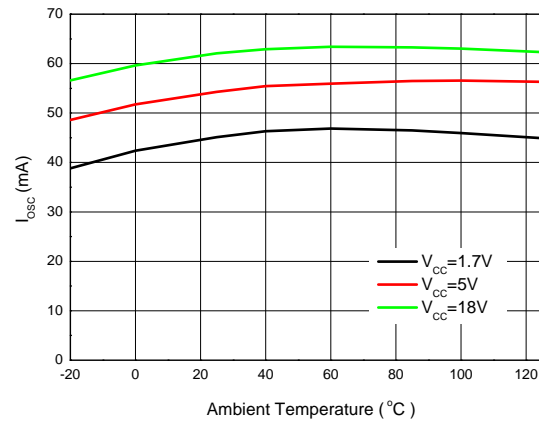
**Low Output Level of Current Control Loop
Op-Amp vs. Ambient Temperature**



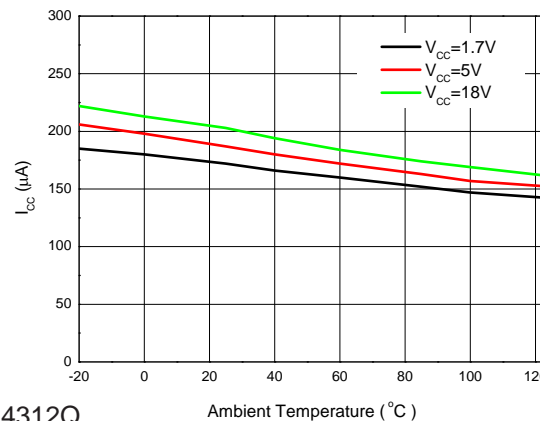
**Output Short Circuit Current of Voltage Control
Loop Op-Amp vs. Ambient Temperature**



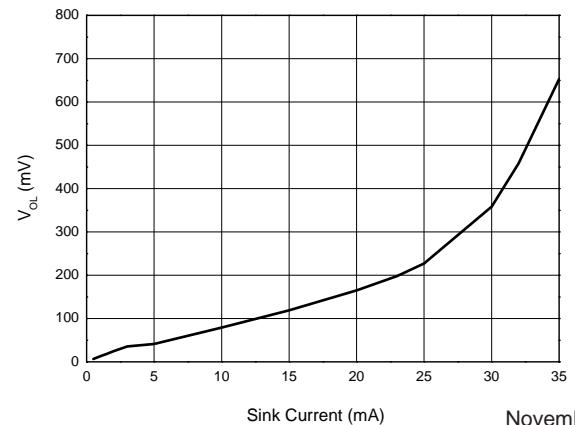
**Output Short Circuit Current of Current Control
Loop Op-Amp vs. Ambient Temperature**



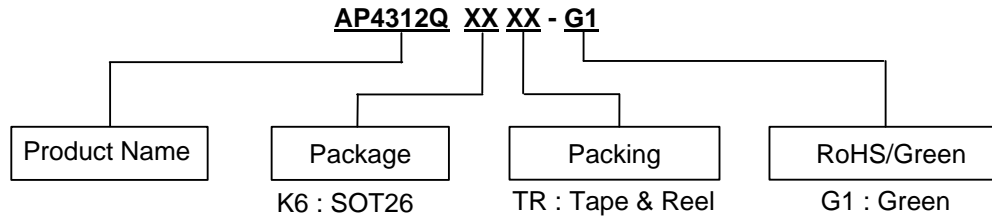
**Total Supply Current Not Including the
Output Sinking Current vs. Ambient Temperature**



Low Output Voltage Level vs. Sink Current



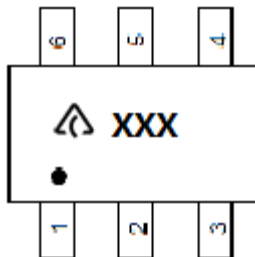
Ordering Information




Package	Part Number	Marking ID	Packing
SOT26	AP4312QK6TR-G1	GKD	3000/Tape & Reel

Marking Information

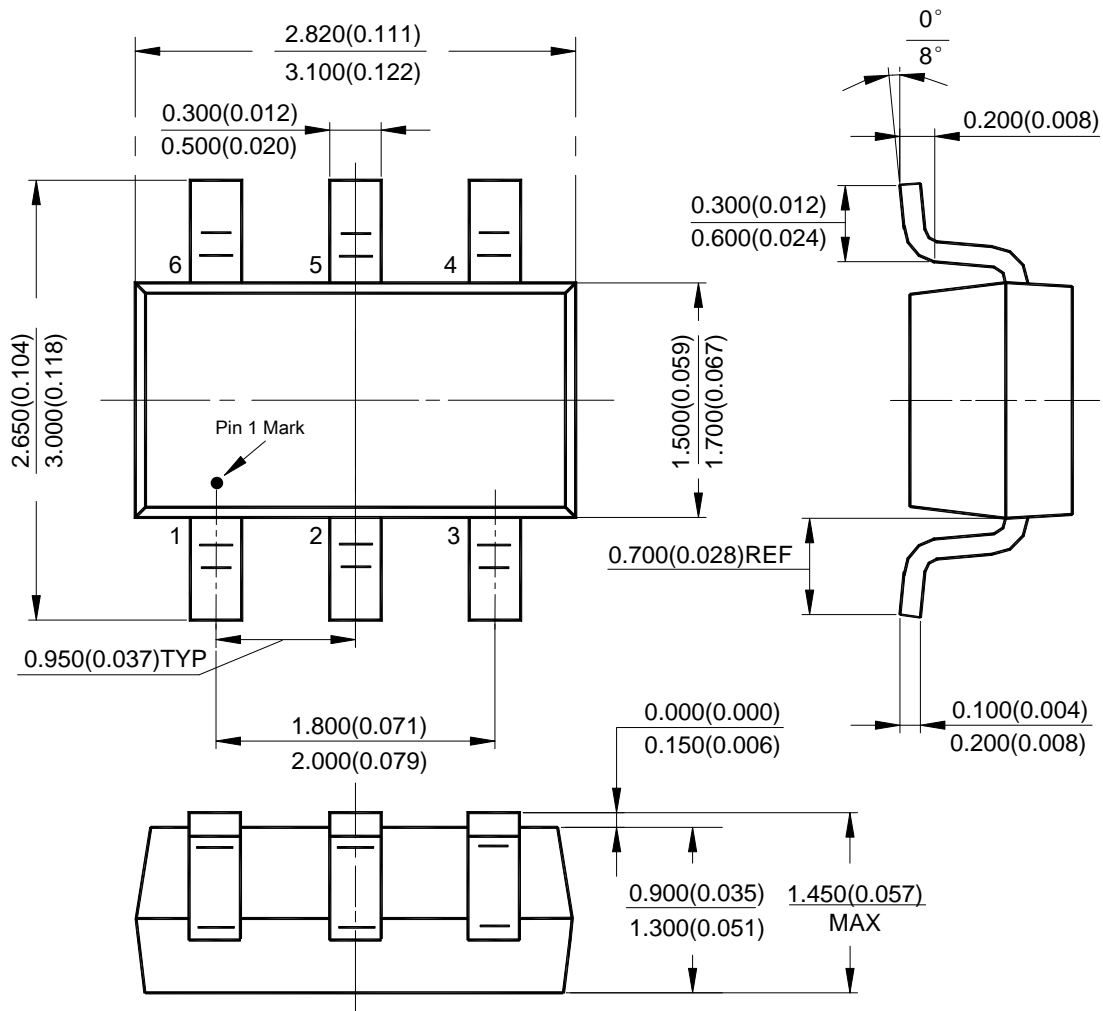
(Top View)



 : Logo
 XXX: Marking ID (See Ordering Information)

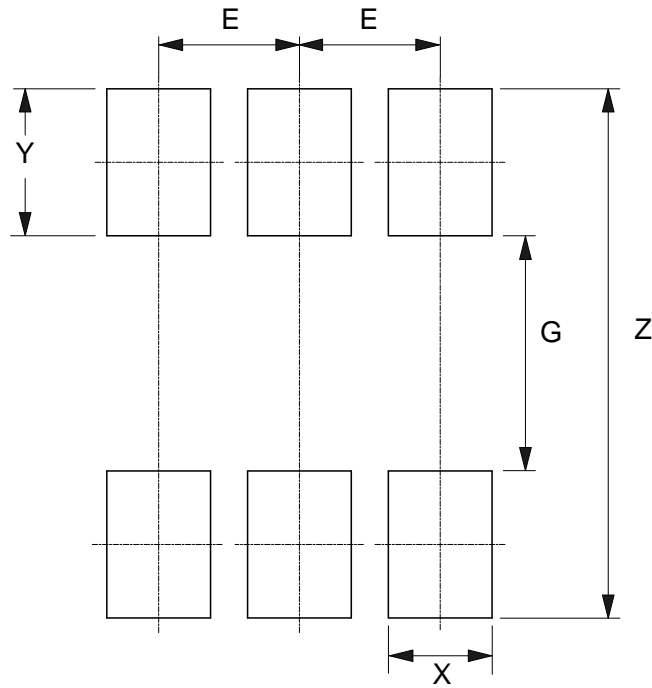
Package Outline Dimensions (All dimensions in mm(inch).)

(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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