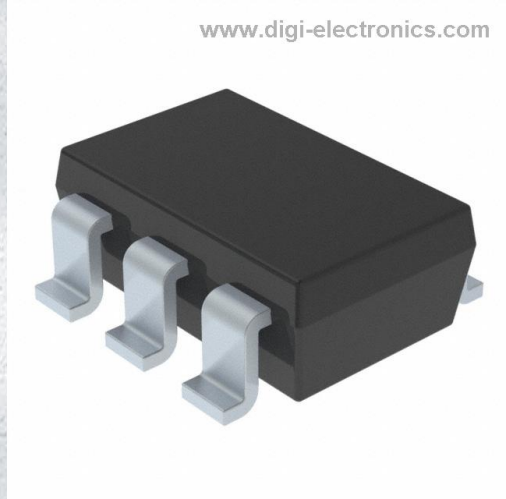
AP4320AK6TR-G1 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	AP4320AK6TR-G1-DG
Manufacturer	Diodes Incorporated
Manufacturer Product Number	AP4320AK6TR-G1
Description	IC CURRENT SENSE 1 CIRCUIT SOT26
Detailed Description	Current Sense Amplifier 1 Circuit SOT-26

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
AP4320AK6TR-G1	Diodes Incorporated
Series:	Product Status:
-	Active
Amplifier Type:	Number of Circuits:
Current Sense	1
Output Type:	Slew Rate:
-	-
Current - Input Bias:	Current - Supply:
50 nA	500µA
Current - Output / Channel:	Voltage - Supply Span (Min):
27 mA	2.5 V
Voltage - Supply Span (Max):	Operating Temperature:
18 V	-40°C ~ 105°C
Mounting Type:	Package / Case:
Surface Mount	SOT-23-6
Supplier Device Package:	Base Product Number:
SOT-26	AP4320

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	3 (168 Hours)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8542.39.0001	

Lead-free Green

AP4320

CONSTANT VOLTAGE AND CONSTANT CURRENT CONTROLLER

Description

The AP4320 is a highly integrated solution for a constant voltage/constant current mode SMPS application.

The AP4320 contains one 2.5V voltage reference and two operational amplifiers. The 2.5V voltage reference, combined with one operational amplifier, makes of an ideal voltage controller for use in adapters and battery chargers. The low-voltage reference, combined with another operational amplifier, makes of an ideal current limiter for output low side current sensing.

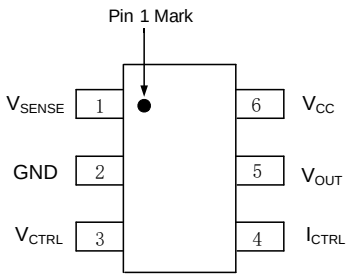
The AP4320 is available in SOT26 package.

Features

- Constant Voltage and Constant Current Control
- Low External Component Count
- Easy Compensation
- Low Supply Current: 190μA
- Precision Internal Voltage Reference: 2.5V
- Operating Supply Voltage: 3.5V to 36V
- Low Current-Sense Threshold: 30mV/50mV
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Pin Assignments

(Top View)



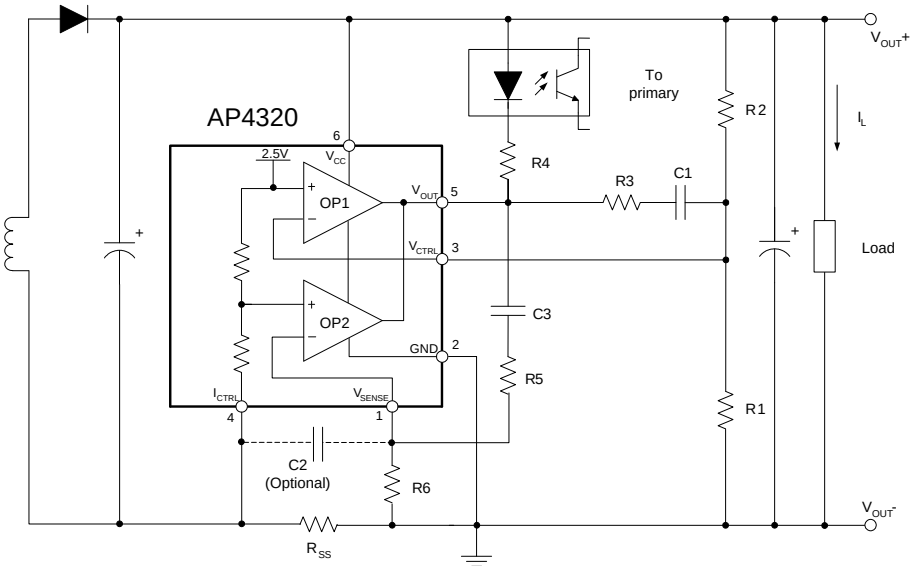
SOT26

Applications

- AC/DC adapters
- Battery chargers
- LED drivers

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

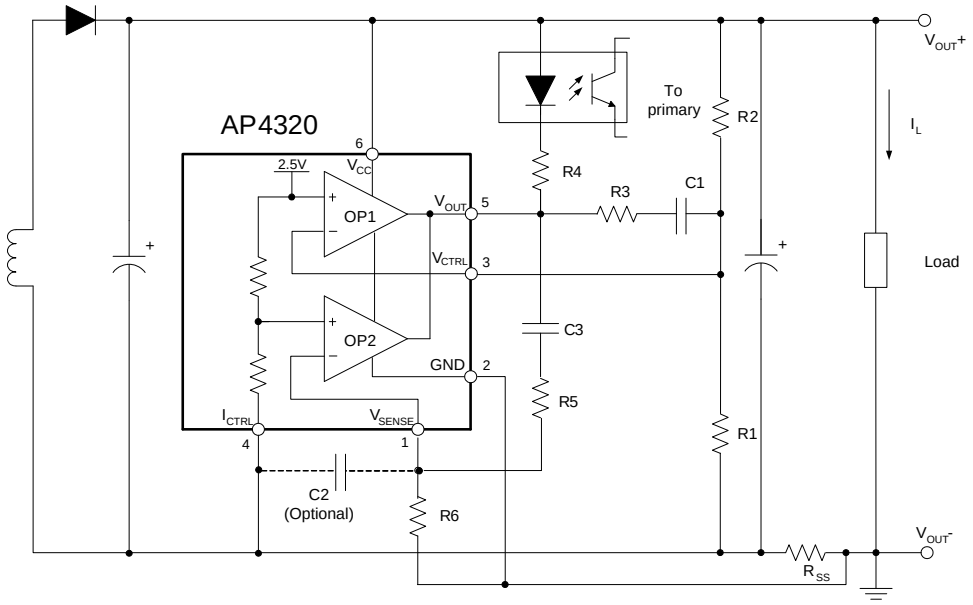
Typical Applications Circuit



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

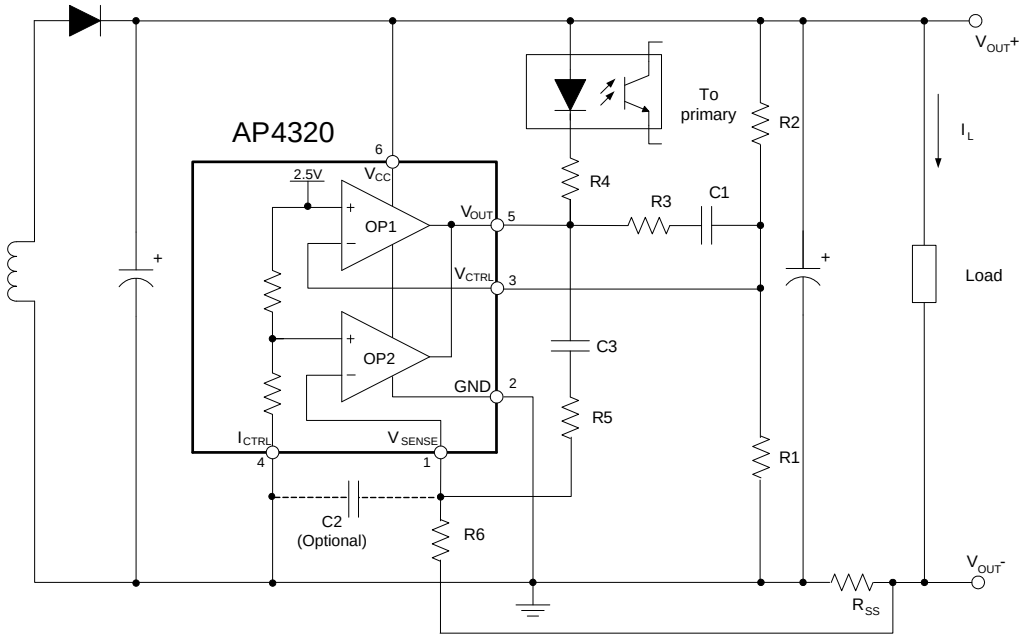
Typical Application 1

Typical Applications Circuit (continued)



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

Typical Application 2



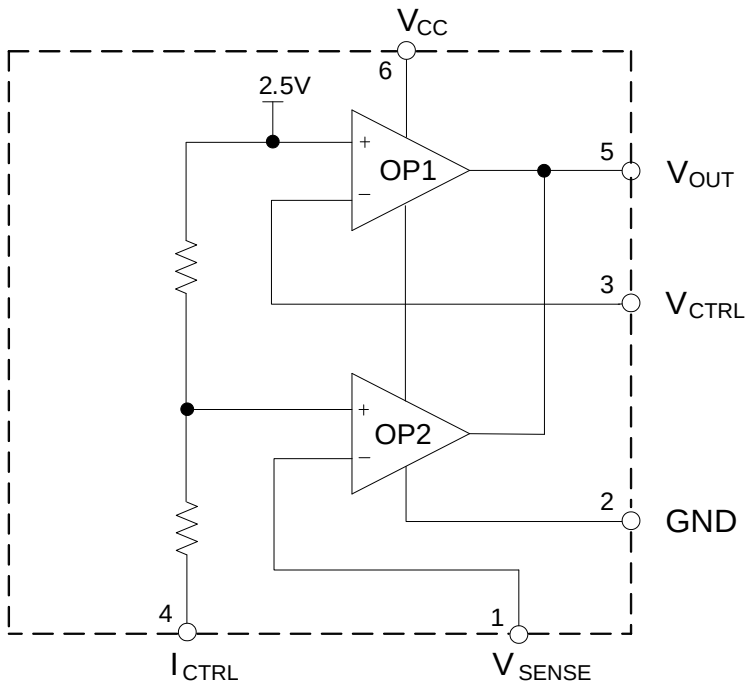
$$V_{OUT} = V_{REF} \times \frac{R1 + R2}{R1} - (I_L \times R_{SS}) \qquad CurrentLimit = \frac{V_{SENSE} \times V_{REF}}{(V_{SENSE} + V_{REF}) \times R_{SS}}$$

Typical Application 3

Pin Descriptions

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

Functional Block Diagram



Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating	Unit
V_{CC}	Power Supply Voltage	-0.3 to 38	V
V_{OUT}	Input Voltage (V_{OUT} Pin)	-0.3 to V_{CC}	V
V_{ICTRL}	Input Voltage (I_{CTRL} Pin)	-0.3 to 18	V
V_{SENSE}	Input Voltage (V_{SENSE} Pin)	-0.3 to 18	V
V_{VCTRL}	Input Voltage (V_{CTRL} Pin)	-0.3 to 18	V
T_J	Junction Temperature	+150	°C
T_{STG}	Storage Temperature	-55 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* can 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 can affect device reliability.

Recommended Operating Conditions

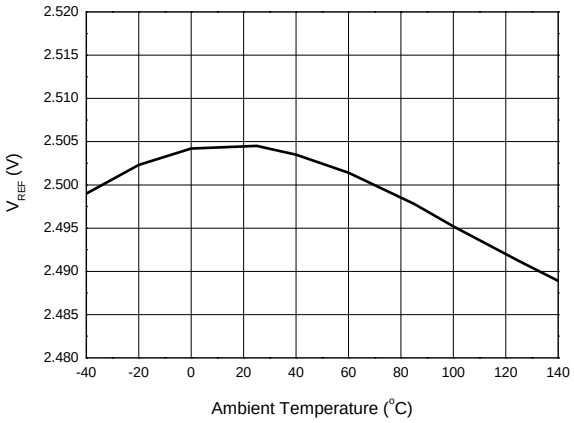
Symbol	Parameter	Min	Max	Unit
V_{CC}	Power Supply Voltage	3.5	36	V

Electrical Characteristics (@V_{CC}=20V, -25°C <T_A<+125°C, unless otherwise specified.)

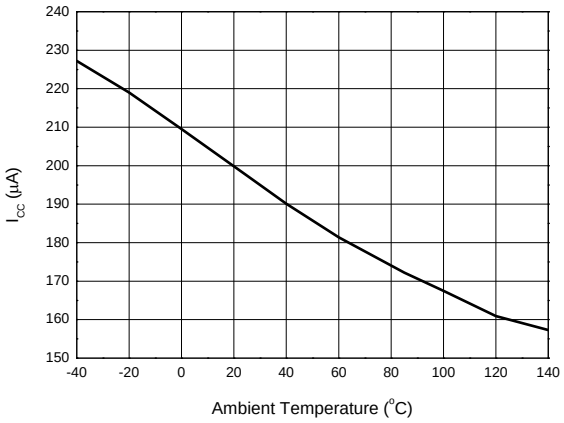
Symbol	Parameters	Conditions		Min	Typ	Max	Unit
TOTAL CURRENT CONSUMPTION							
I_{CC}	Total Supply Current Not Including the Output Sinking Current	V_{ICTRL}=V_{SENSE}=0V, V_{OUT}=Open		–	190	–	μA
VOLTAGE CONTROL LOOP							
Gmv	Transconduction Gain (V_{CTRL}). Sink Current Only	–		1	3.5	–	mA/mV
V_{REF}	Voltage Control Loop Reference	T_A=+25ºC		2.488	2.50	2.512	V
		–		2.48	–	2.52	
I_{IBV}	Input Bias Current (V_{CTRL})	–		–	25	–	nA
CURRENT CONTROL LOOP							
Gmi	Transconduction Gain (I_{CTRL}). Sink Current Only	–		1.5	7	–	mA/mV
V_{SENSE}	Current Control Loop Reference	AP4320A	T_A = +25°C	29	30	31	mV
			–	28	30	32	
		AP4320B	T_A = +25°C	48.5	50	51.5	
			–	46	50	54	
I_{IBI}	Current Out of Pin I_{CTRL} at V_{SENSE}	AP4320A	V_{ICTRL}=-30mV	–	16	–	μA
		AP4320B	V_{ICTRL}=-50mV	–	16	–	
OUTPUT STAGE							
V_{OL}	Low Output Voltage at 2mA Sinking Current	–		–	30	100	mV
I_{OS}	Output Short-Circuit Current. Sink Current Only	V_{OUT}=4V		–	30	–	mA

Performance Characteristics

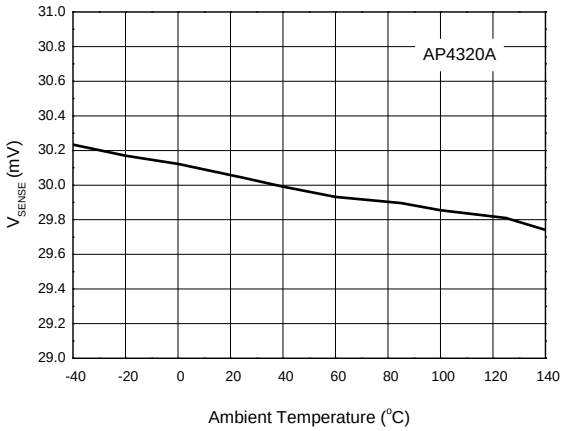
V_{REF} vs. Ambient Temperature



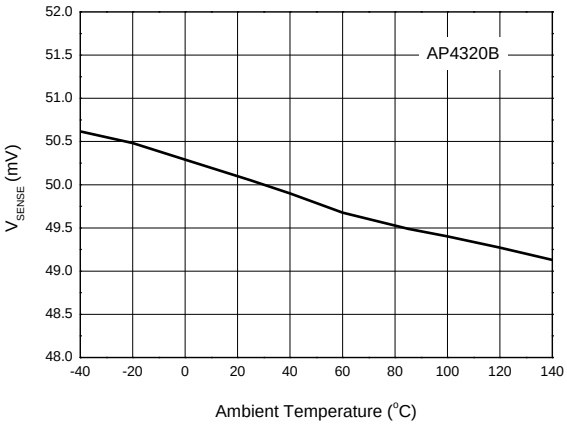
I_{CC} vs. Ambient Temperature



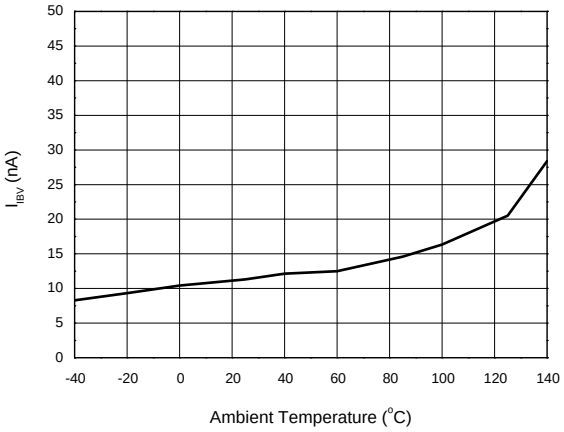
V_{SENSE} vs. Ambient Temperature



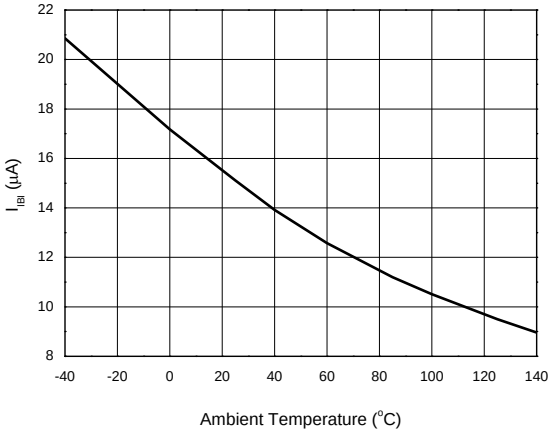
V_{SENSE} vs. Ambient Temperature



I_{IBV} vs. Ambient Temperature

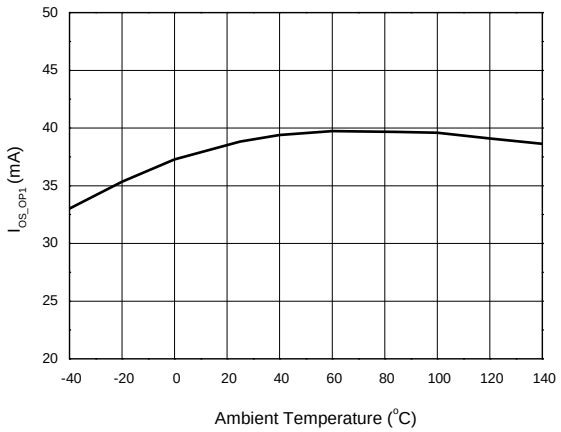


I_{IBI} vs. Ambient Temperature

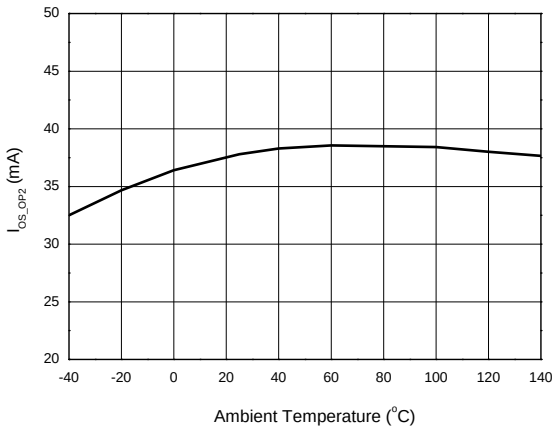


Performance Characteristics (continued)

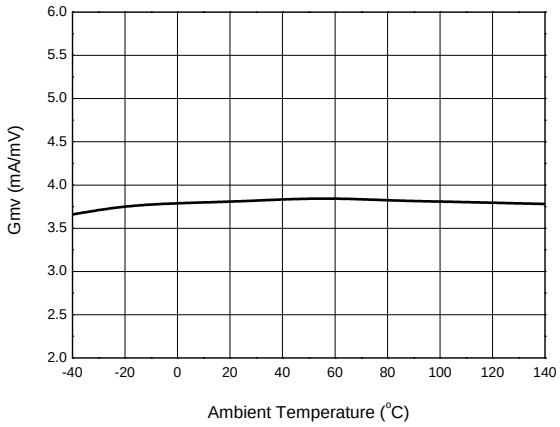
I_{OS_OP1} vs. Ambient Temperature



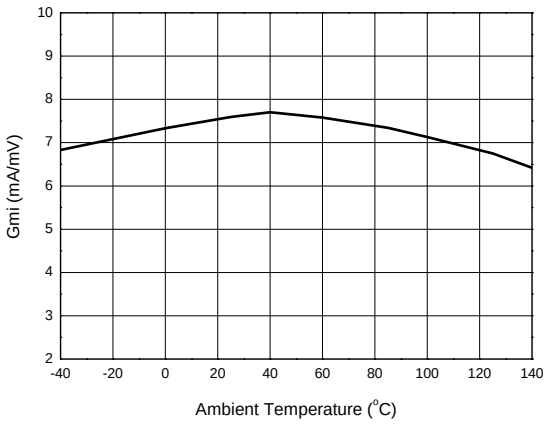
I_{OS_OP2} vs. Ambient Temperature



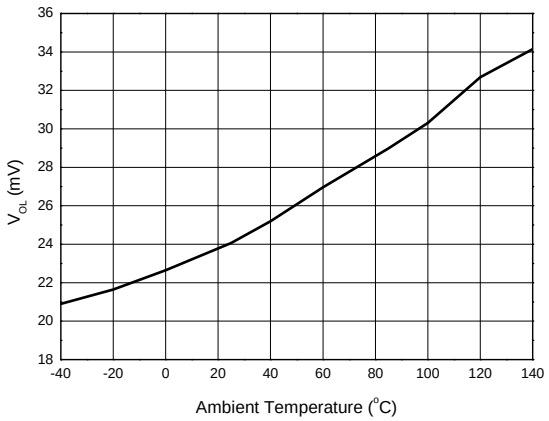
Gmv vs. Ambient Temperature



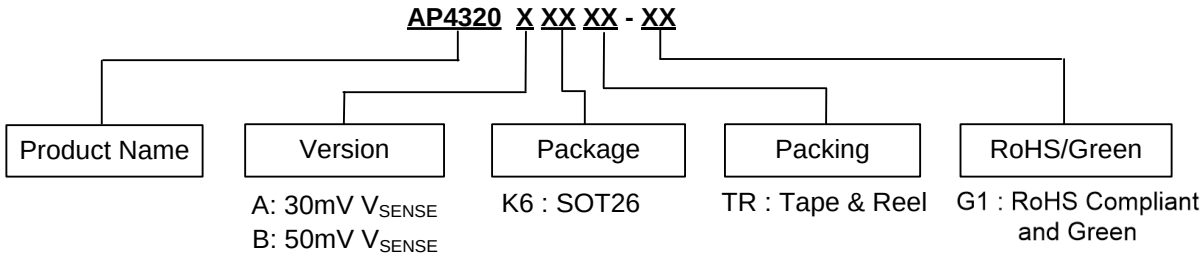
Gmi vs. Ambient Temperature



V_{OL} vs. Ambient Temperature



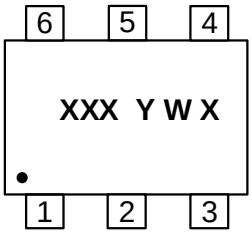
Ordering Information



Orderable Part Number	Package	Marking ID	Packing	
			Qty.	Carrier
AP4320AK6TR-G1	SOT26	GJZ	3000	Tape & Reel
AP4320BK6TR-G1	SOT26	GKW	3000	Tape & Reel

Marking Information

(Top View)

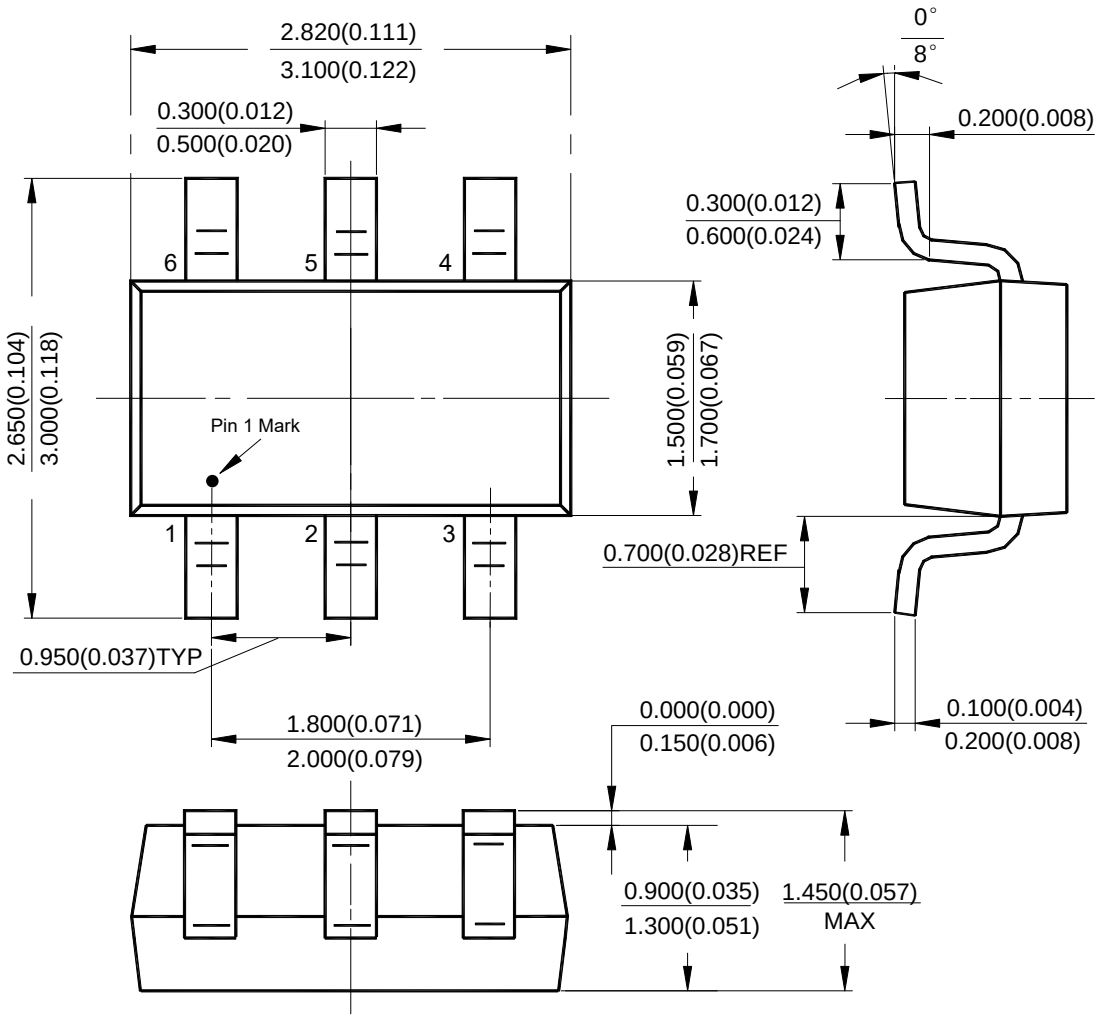


XXX : Marking ID
Y : Year 0 to 9
W : Week : A to Z : Week 1 to 26;
a to z : Week 27 to 52; z Represents Week 52 and 53
X : Internal Code

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

Please see http://www.diodes.com/package-outlines.html for the latest version.

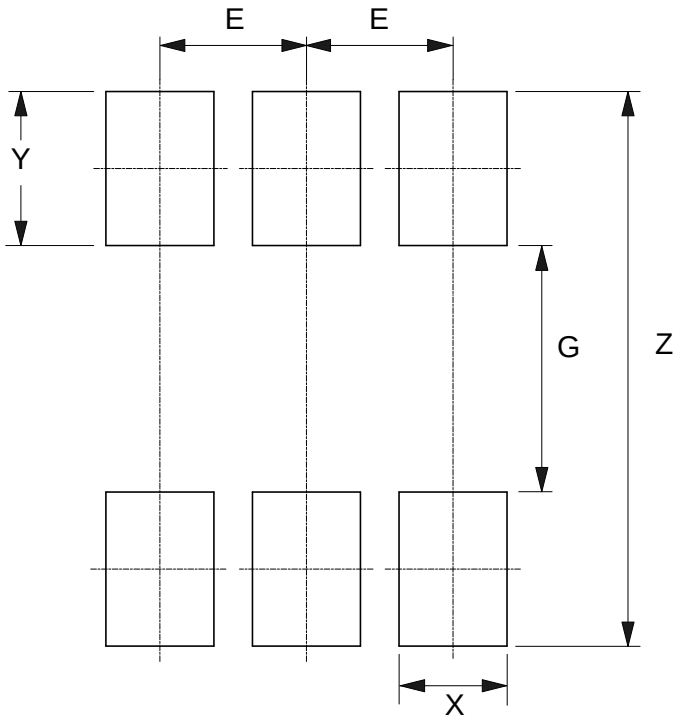
SOT26



Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

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

Mechanical Data

- Moisture Sensitivity: Level 3 per JESD22-A113
- Terminals: Finish – Matte Tin Plated Leads, Solderable per JESD22-B102 (e3)
- Weight: 0.016 grams (Approximate)

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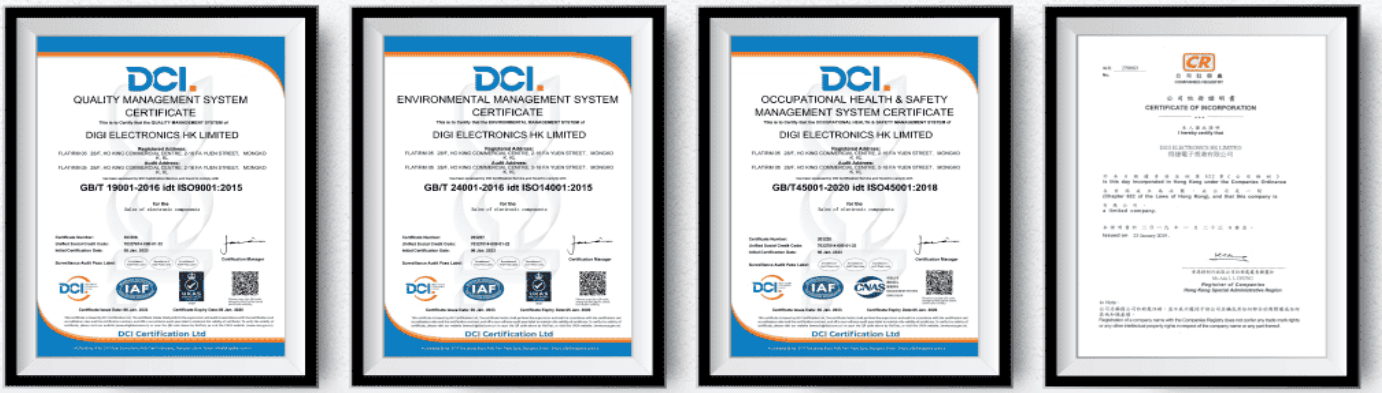

Tel: +00 852-30501935

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