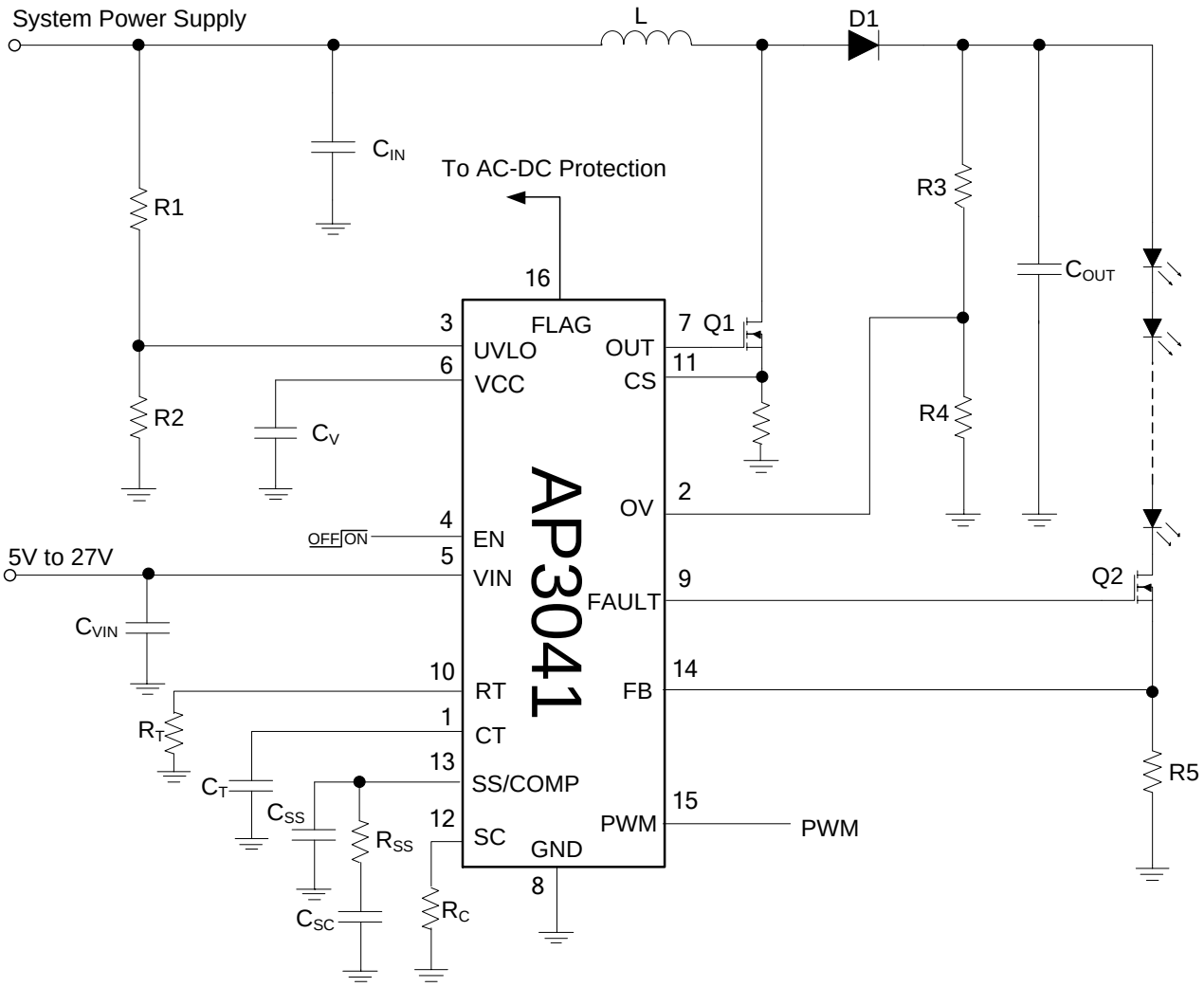
Typical Applications Circuit



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Pin Descriptions

Pin Number	Pin Name	Function
1	CT	Capacitor Setting Shut Down Delay Time
2	OV	Over Output Voltage Protection Pin
3	UVLO	Two resistors connected from this pin to GND and the power supply respectively is used to set start-up and shutdown level.
4	EN	Enable Pin
5	VIN	Input supply pin. This pin must be locally bypassed.
6	VCC	This pin should be bypassed to GND with a ceramic capacitor.
7	OUT	Connect this pin to the gate of external MOSFET, the gate driver has 1A peak current capability.
8	GND	Ground
9	FAULT	This pin can be used to drive the external MOSFET. The logic of the driver signal is controlled by that of PWM pin and the signal phase of them is the same. This pin is pulled to ground under fault condition of OVP, UVLO, OTP, diode short circuit and LED short circuit.
10	RT	An external resistor connected from this pin to GND is used to set the operating frequency.
11	CS	Sense switch current pin, which is used for current mode control and for current limit. The current limit voltage is 500mV.
12	SC	Slope compensation for current sense. A resistor between SC and GND will program the slope compensation.
13	SS/COMP	An external soft-start time capacitor is placed from this pin to GND and is charged by an internal 20μA current source to control regulator soft-start time. Compensation pin. This pin is the output of the internal error amplifier.
14	FB	Voltage feedback pin. The reference voltage is 500mV.
15	PWM	This pin can be connected to current matched chip and receives error signal used to shut down the system.
16	FLAG	Fault condition output pin. When the output is in short circuit condition, the FLAG outputs logic low to shut down the power path. Please refer to the application circuit.

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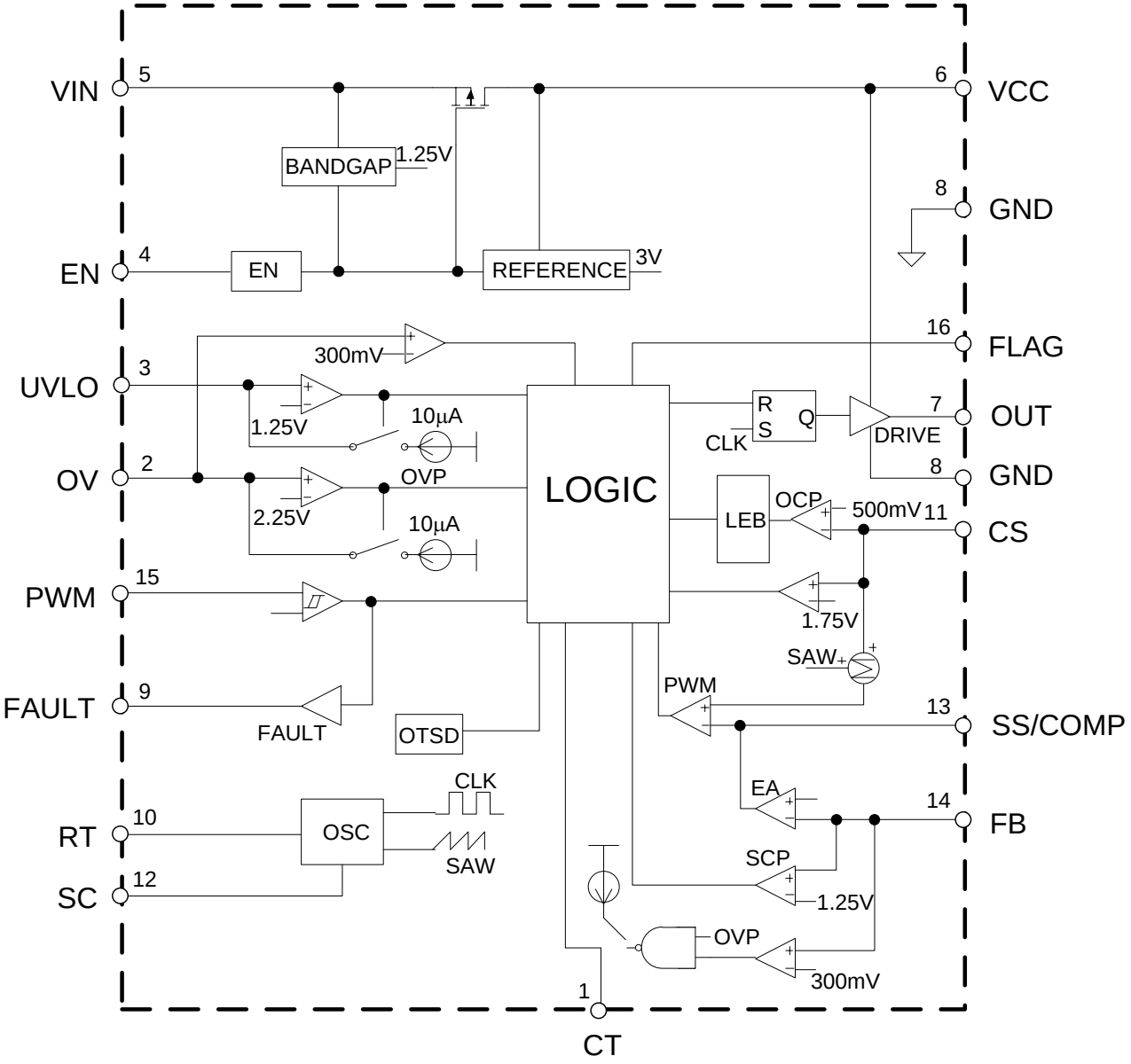
Functional Block Diagram



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Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Value	Unit
V_{IN}	Input Voltage	30	V
V_{CC}	VCC Pin Voltage	20	V
V_{OUT}	OUT Pin Voltage	20	V
V_{FAULT}	FAULT Pin Voltage	20	V
V_{FB}	FB Pin Voltage	20	V
V_{UVLO}	UVLO Pin Voltage	7	V
V_{CS}	CS Pin Voltage	20	V
V_{SC}	SC Pin Voltage	7	V
V_{FLAG}	FLAG Pin Voltage	7	V
$V_{SS/COMP}$	SS/COMP Pin Voltage	7	V
V_{RT}	RT Pin Voltage	7	V
V_{PWM}	PWM Pin Voltage	7	V
V_{EN}	EN Pin Voltage	30	V
V_{OV}	OV Pin Voltage	7	V
θ_{JA}	Thermal Resistance (Junction to Ambient, No Heat Sink, Free Air)	82	ºC/W
T_J	Operating Junction Temperature	+150	ºC
T_{STG}	Storage Temperature	-65 to +150	ºC
T_{LEAD}	Lead Temperature (Soldering, 10s)	+260	ºC
—	ESD (Human Body Model)	2000	V
—	ESD (Machine Model)	200	V

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_{IN}	Input Voltage	5	27	V
f	Operating Frequency	0.1	1	MHz
T_J	Operating Temperature Range	-40	+85	ºC

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Electrical Characteristics (V_{CC}=12V, V_{EN}=3.3V, T_A=+25ºC, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IN}	Input Voltage	—	5	—	27	V
V_{FB}	Feedback Voltage	—	490	500	510	mV
I_{CC}	Supply Current	V_{FB}=V_{IN}, No Switching	—	1.5	5	mA
I_Q	Shutdown Supply Current	V_{EN}=0	—	1	2	μA
V_{CC}	VCC Pin Voltage	11V≤V_{IN}≤27V	9.5	10.0	10.5	V
		5V≤V_{IN}≤10V, I_{CC}=5mA	V_{IN}-0.5	—	—	V
I_{CC-LIM}	VCC Pin Current Limit	—	—	35	—	mA
V_{CC-HI}	VCC Pin UVLO Rising Threshold	—	—	4.7	—	V
V_{CC-HYS}	VCC Pin UVLO Falling Hysteresis	—	—	300	—	mV
f_{OSC}	Oscillator Frequency	—	0.1	—	1	MHz
V_{SC_PK}	SC Peak Voltage	—	530	—	680	mV
V_{UVLO}	UVLO Threshold	—	1.20	1.25	1.30	V
$I_{UVLO-HYS}$	UVLO Hysteresis Current Source	—	—	10	—	μA
V_{CS}	Current Limit Threshold Voltage	—	0.48	0.5	0.52	V
V_{RT}	RT Voltage	—	1.20	1.25	1.30	V
G_V	Error Amplifier Voltage Gain	—	—	680	—	V /V
G_S	Error Amplifier Transconductance	—	—	500	—	μA/V
V_{EH}	EN Pin Threshold Voltage	—	2.5	—	—	V
V_{EL}		—	—	—	0.5	
V_{IH}	PWM Pin Threshold Voltage	—	2.5	—	—	V
V_{IL}		—	—	—	0.5	
V_{OV}	OV Threshold	—	—	2.25	—	V
I_{OV-HYS}	OV Hysteresis Current Source	—	—	10	—	μA
V_{FB_LOW}	LED- Short to GND Detection Level	—	—	0.3	—	V
V_{FB_HIGH}	LED+ Short to LED-Detection Level	—	—	1.25	—	V
V_{OV_LOW}	LED+ Short to GND Detection Level	—	—	0.3	—	V
V_{CS_HIGH}	Diode Short Detection Level	—	—	1.75	—	V
I_{CT}	CT Current Source	—	—	5	—	μA
V_{CT}	CT Threshold Voltage	—	—	2.6	—	V

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Electrical Characteristics (continued, V_{CC}=12V, V_{EN}=3.3V, T_A=+25ºC, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
D_{MAX}	Maximum Duty Cycle	f=200kHz	80	90	—	%
I_{SS}	Soft-Start Current Source	—	16	22	28	μA
t_{RISE}	OUT Pin Rising Time	C_{OUT}=1nF	—	20	—	ns
t_{FALL}	OUT Pin Falling Time	C_{OUT}=1nF	—	20	—	
V_{OUT-H}	OUT High Voltage Level (V_{CC}-V_{OUT})	I_{OUT}=50mA	—	0.25	0.75	V
V_{OUT-L}	OUT Low Voltage Level (V_{OUT})	I_{OUT}=50mA	—	0.25	0.75	V
t_{RISE}	FAULT Pin Rising Time	C_{FAULT}=1nF	—	100	—	ns
t_{FALL}	FAULT Pin Falling Time	C_{FAULT}=1nF	—	100	—	
V_{FAULT_H}	FAULT High Voltage Level (V_{CC}-V_{FAULT})	I_{FAULT}=10mA	—	0.25	0.75	V
V_{FAULT_L}	FAULT Low Voltage Level	I_{FAULT}=10mA	—	0.25	0.75	V
t_D	FAULT Minimum Pulse Width	Oscillator Frequency=200kHz	—	20	—	μs
V_{FLAG-H}	FLAG High Voltage Level	I_{FLAG}=500μA	—	2	—	V
V_{FLAG-L}	FLAG Low Voltage Level	I_{FLAG}=500μA	—	0.25	0.75	V
T_{OTSD}	Thermal Shutdown Temperature	—	—	+160	—	ºC
T_{HYS}	Thermal Shutdown Hysteresis	—	—	+20	—	ºC

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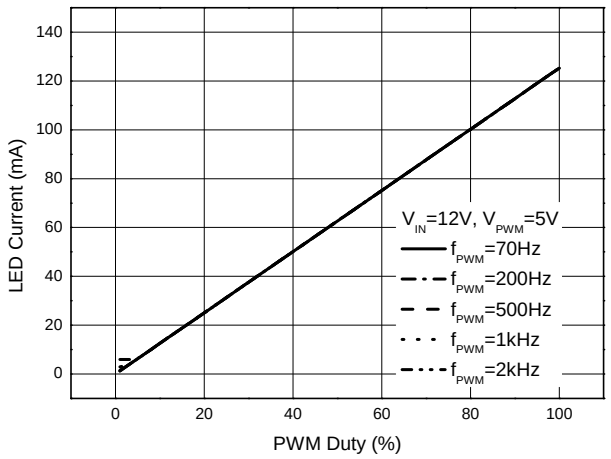
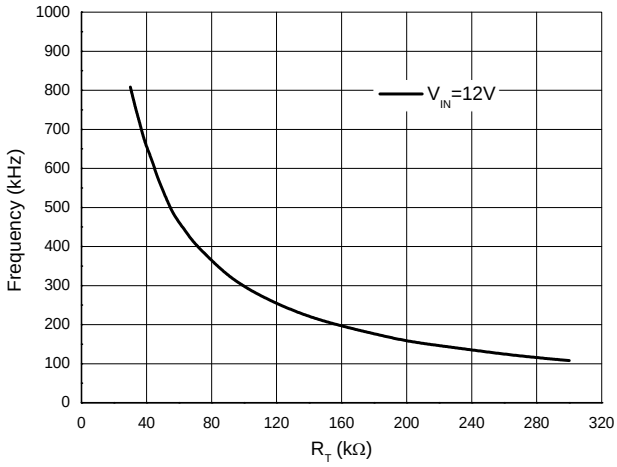
Performance Characteristics

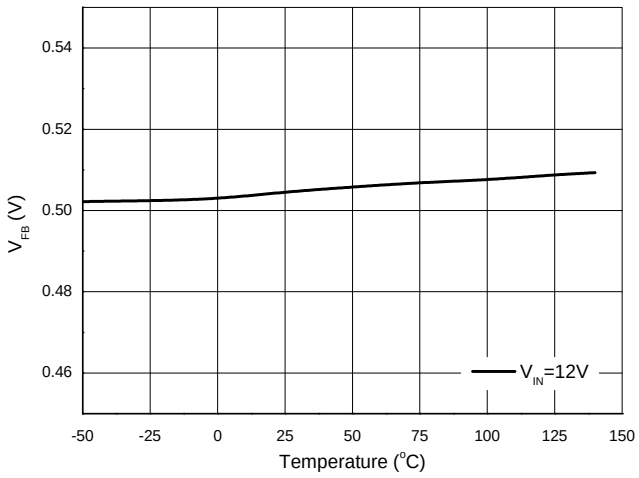
LED Current vs. PWM Duty



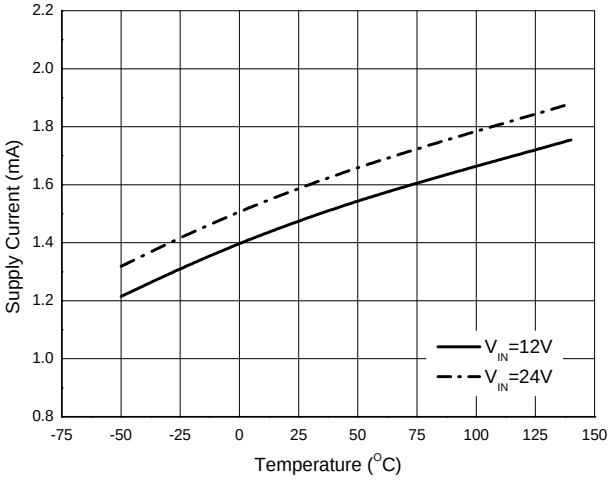
Frequency vs. R_T



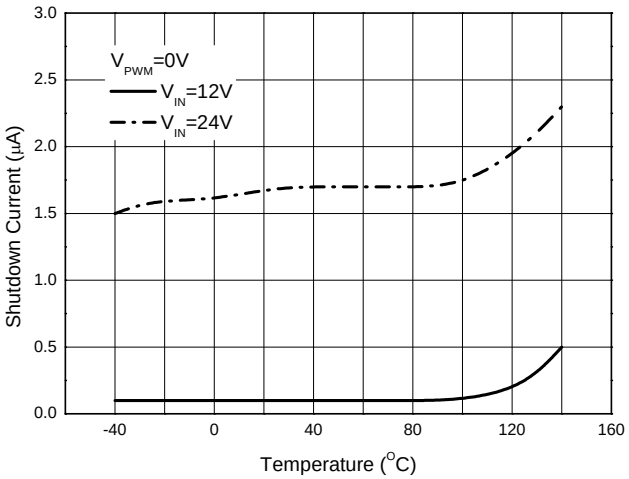
V_{FB} vs. Temperature



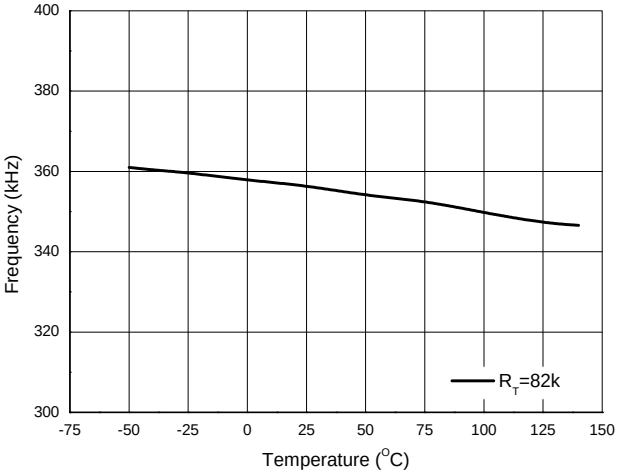
Supply Current vs. Temperature



Supply Current vs. Temperature



Frequency vs. Temperature



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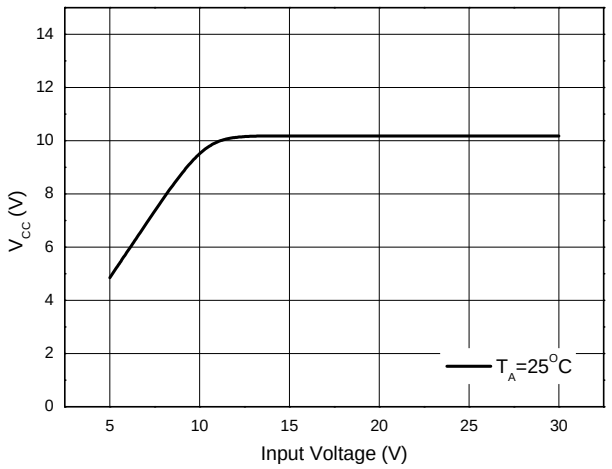
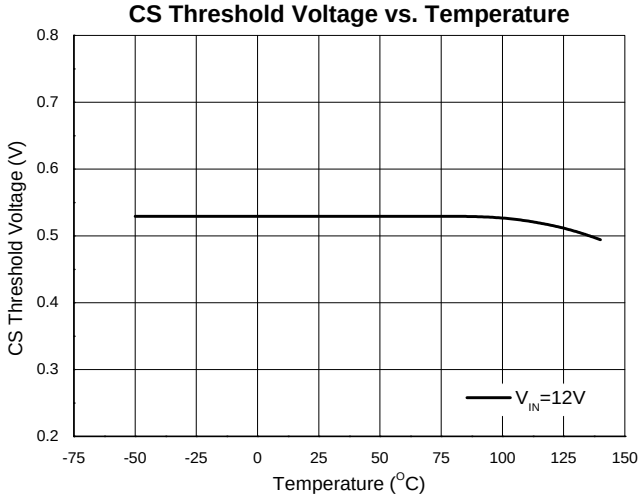
Performance Characteristics (continued)

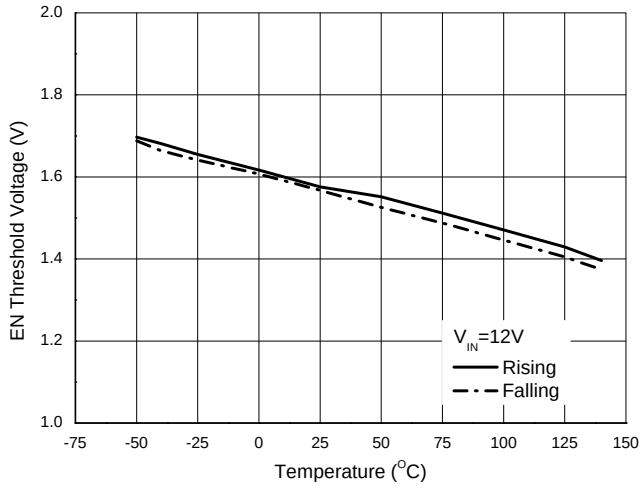
V_{CC} vs. Input Voltage



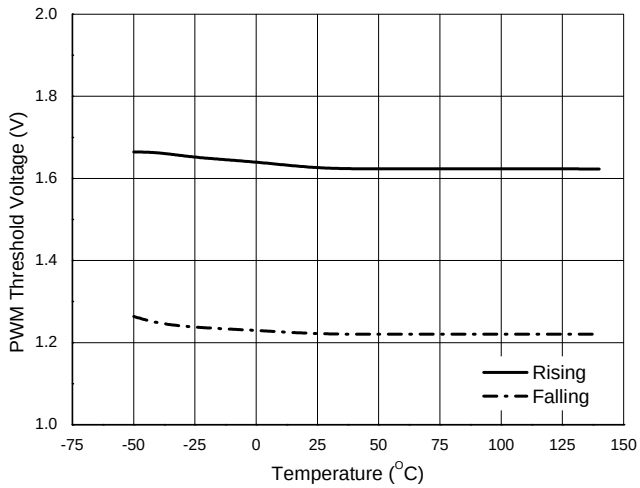
CS Threshold Voltage vs. Temperature



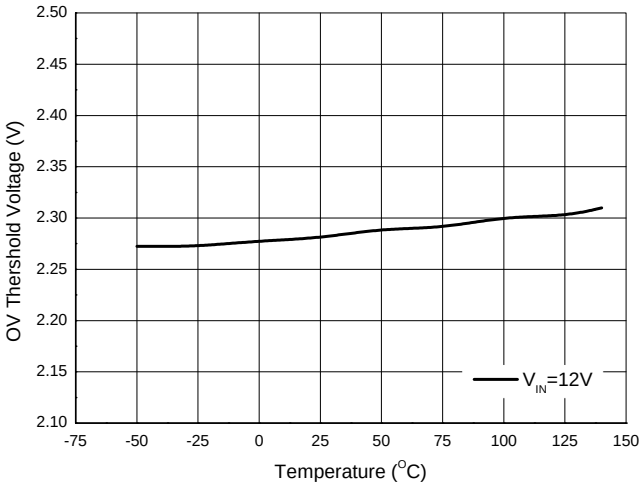
EN Threshold Voltage vs. Temperature



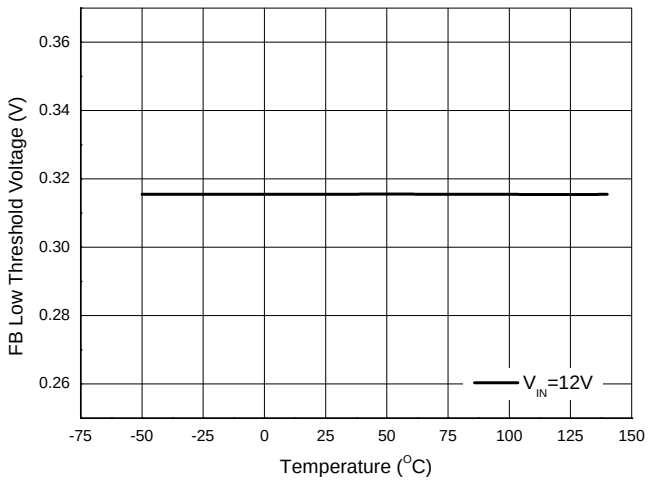
PWM Threshold Voltage vs. Temperature



OV Threshold Voltage vs. Temperature



FB Low Threshold Voltage vs. Temperature



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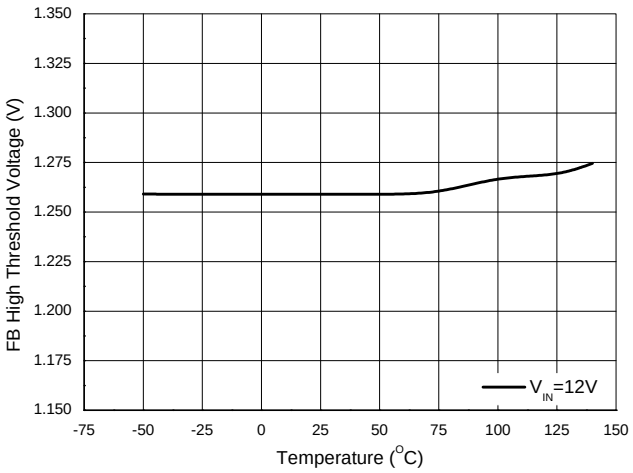
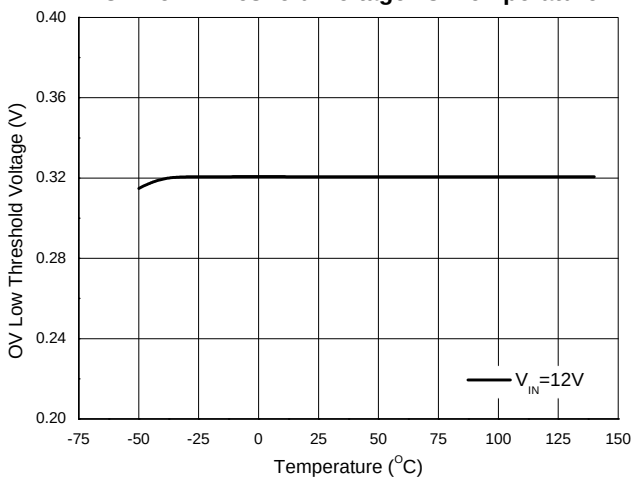
Performance Characteristics (continued)

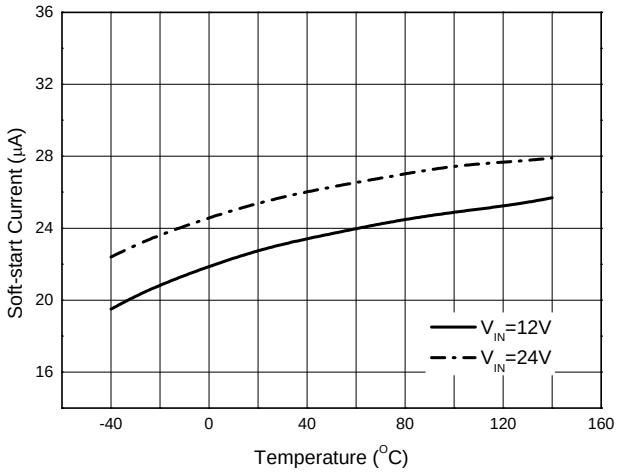
FB High Threshold Voltage vs. Temperature



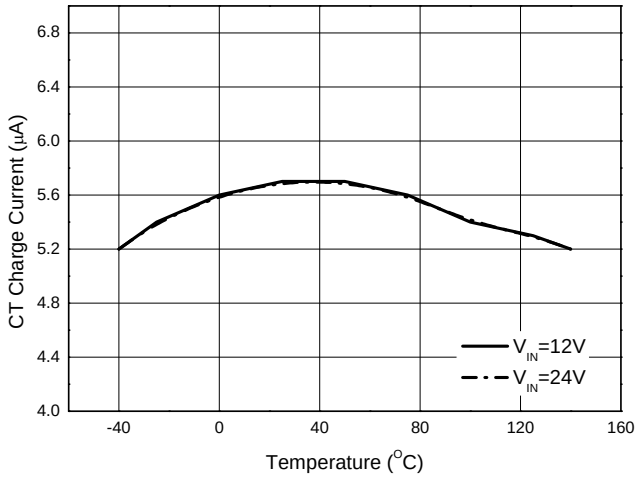
OV Low Threshold Voltage vs. Temperature



Soft-start Current vs. Temperature



CT Charge Current vs. Temperature



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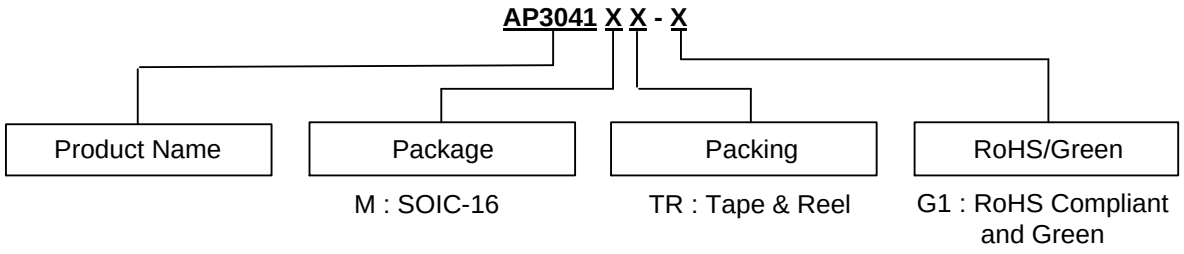
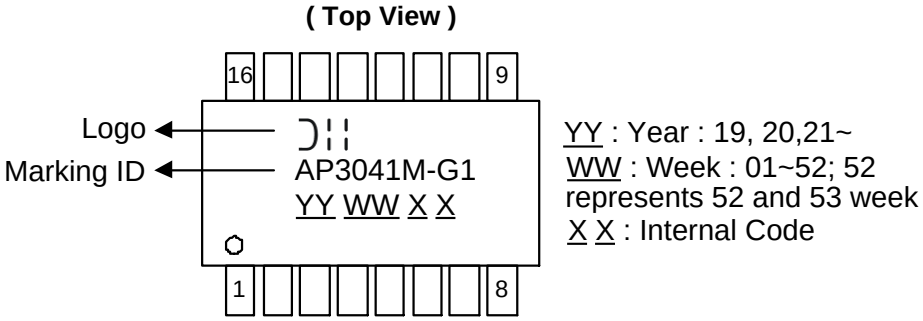
Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing
SOIC-16	-40 to +85°C	AP3041MTR-G1	AP3041M-G1	4,000/13”Tape & Reel

Marking Information



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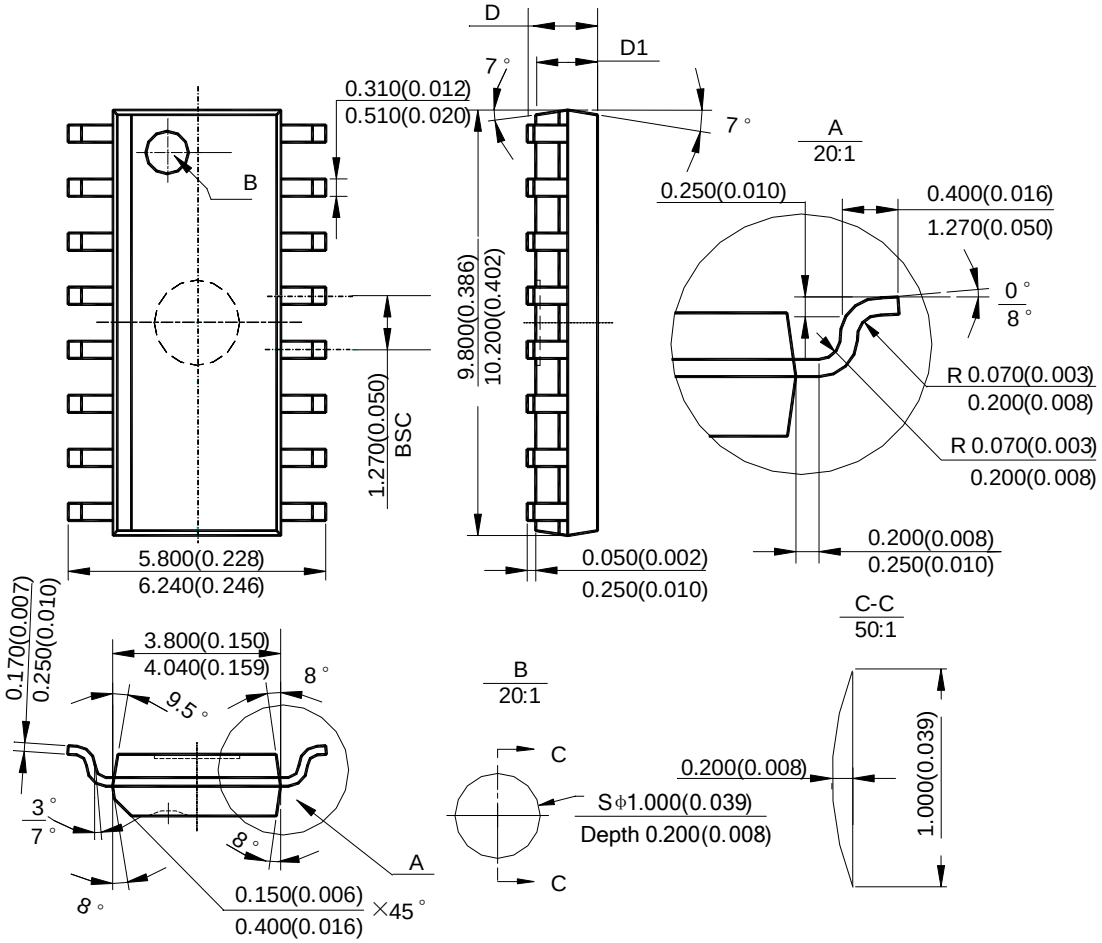
Package Outline Dimensions (All dimensions in mm(inch).)

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

(1) Package Type: SOIC-16



Note: Eject hole, oriented hole and mold mark is optional.

Symbol	D				D1			
	min(mm)	max(mm)	min(inch)	max(inch)	min(mm)	max(mm)	min(inch)	max(inch)
Option1	1.350	1.750	0.053	0.069	1.250	1.650	0.049	0.065
Option2	-	1.260	-	0.050	1.020	-	0.040	-

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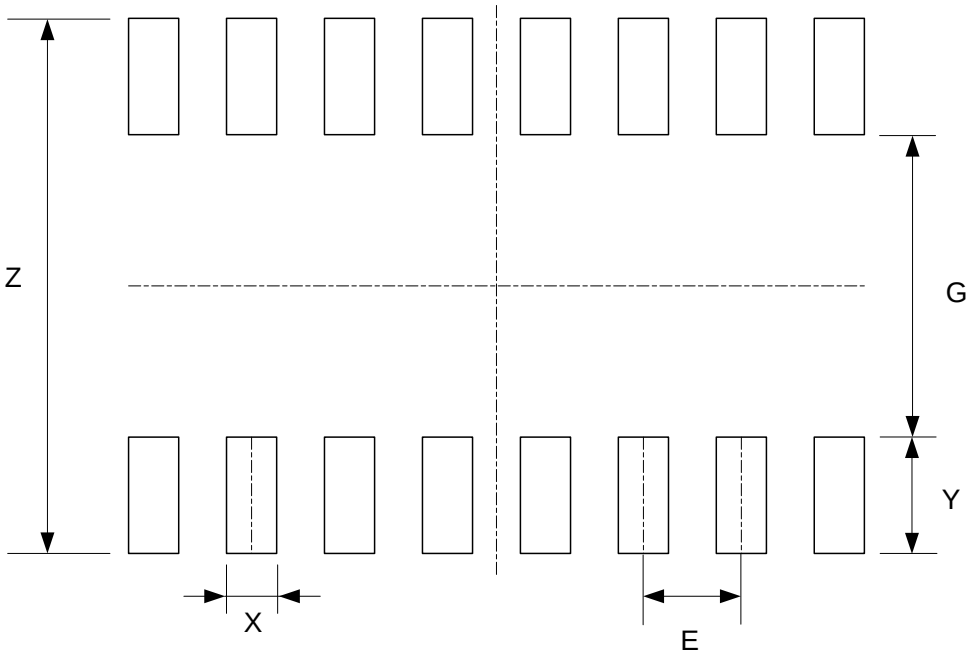
Suggested Pad Layout

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

(1) Package Type: SOIC-16



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	6.900/0.272	3.900/0.154	0.650/0.026	1.500/0.059	1.270/0.050

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