

WS3241C

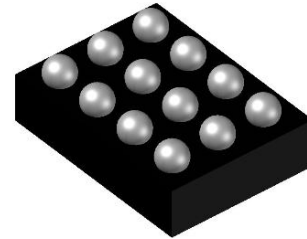
Over-Voltage Protection Load Switch

<http://www.sh-willsemi.com>

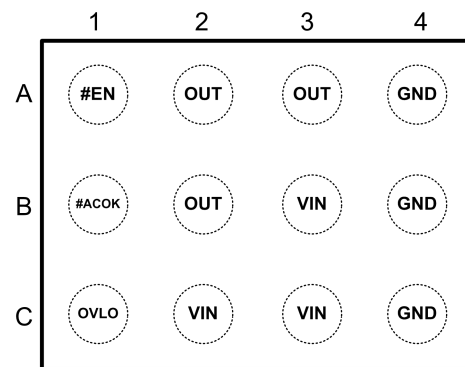
Descriptions

The WS3241C features a low R_{ON} internal high voltage switch and an input range of absolute maximum 29V. The WS3241C behaves Over-Voltage Protection (OVP) that shuts off the internal Switch if OVLO pin voltage exceeds the 1.2V reference voltage. External resistors divider could be used to set the input voltage OVP threshold. The off-state Switch would disconnect the input pin to output pin and protect output from the input high voltage stress. Also, an internal fixed 6.8V-OVP could set by connecting OVLO pin to ground without the external resistors. Integrated Over-Temperature Protection (OTP) also shuts off the Switch to protect the device.

The WS3241C is available in CSP-12L package. Standard product is Pb-free and Halogen-free.



CSP-12L (Bottom View)



Pin Configuration (Top View)

Features

- Surge Protection : 100V
- Absolute Maximum Input Voltage : 29V
- Low R_{ON} Switch (@VIN=5V) : 30mΩ
- Adjustable OVP Threshold
- Fast OVP Response : 70ns
- Thermal Shutdown Protection
- Robust ESD Protection

Applications

- Mobile Handsets and Tablets
- Portable Media Players
- Peripherals



Marking

- 3241** = Device Name
- VC** = Device Code
- Y** = Year Code
- W** = Week Code

Order Information

Device	Package	Shipping
WS3241C-12/TR	CSP-12L	3000/Reel&Tape

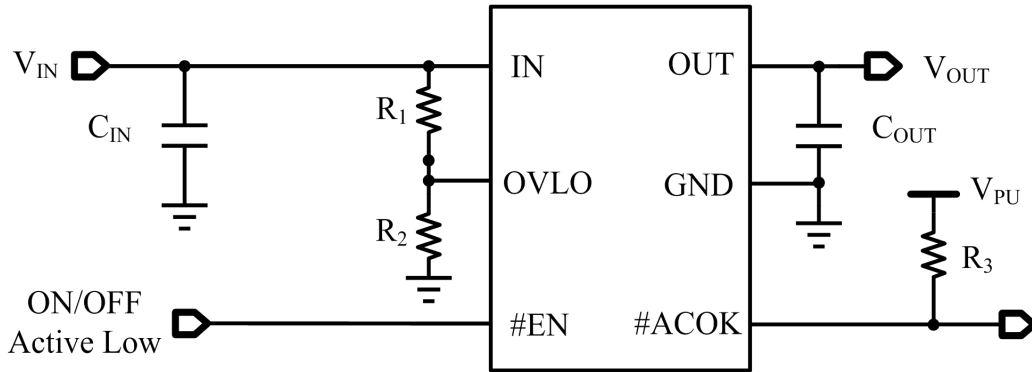
Typical Applications


Fig1. Typical application

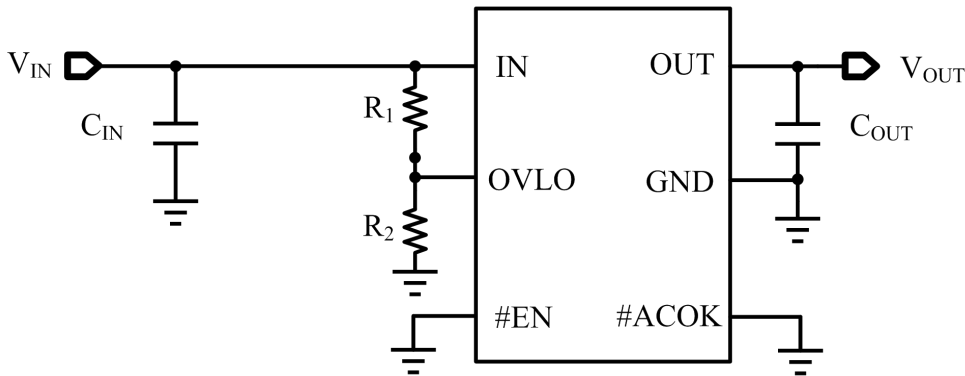


Fig2. Typical application with #EN=0

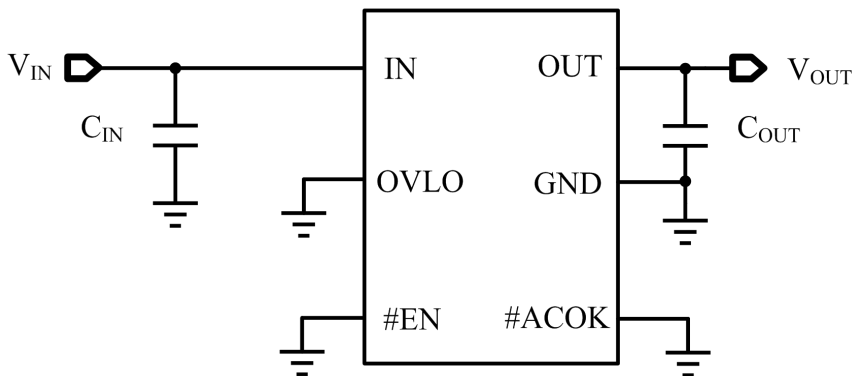


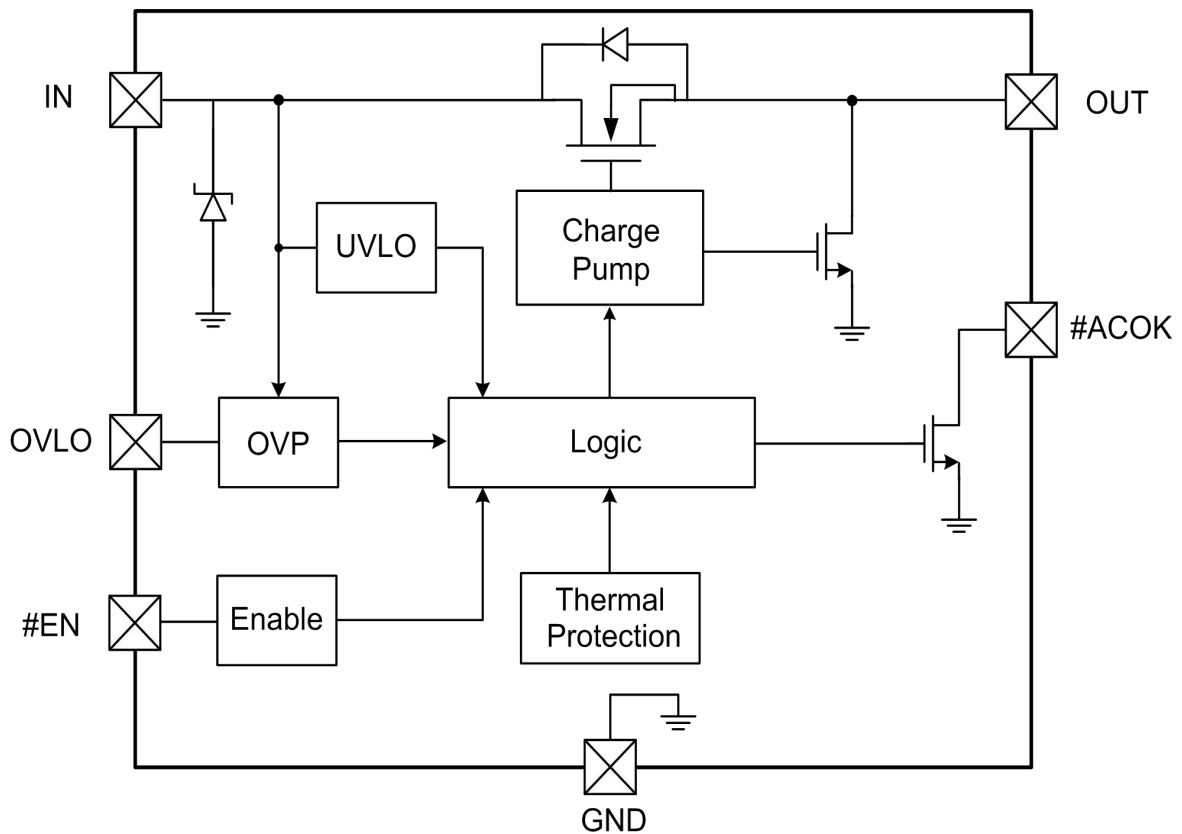
Fig3. Typical application with internal default OVP threshold 6.8V

Note1: R1 and R2 are only required for external OVP, otherwise connect OVLO to GND.

Note2: $V_{OVP} = V_{OVLOTH} \times (R_1 + R_2) / R_2$. Recommended selection: $10K \leq R_2 \leq 50K$.

Pin Descriptions

Pin	Symbol	Type	Descriptions		
B3, C2, C3	IN	Supply	Switch Input Pin and Device Power Supply.		
A2, A3, B2	OUT	Output	Switch Output Pin to Load.		
A4, B4, C4	GND	Ground	Device Ground Pin.		
C1	OVLO	Input	Over-Voltage Lockout Adjustment Pin.		
A1	#EN	Input	Active Low. Connect to GND to enable the device.		
B1	#ACOK	Output	Power Good Index. Open drain connected to a resistor. If not used, connect to GND or floating.	1	UVLO or OVP
				0	Supply stable

Block Diagram


Absolute maximum ratings

Parameter	Symbol	Value	Unit
V_IN voltage range	V _{IN}	-0.3~29	V
V_OUT voltage range	V _{OUT}	V _{IN} +0.3	V
V_OVLO voltage range	V _{OVLO}	-0.3~16	V
V_#ACOK voltage range	V _{#ACOK}	-0.3~6	V
V_#EN voltage range	V _{#EN}	-0.3~6	V
Switch I/O Continuous Current	I _{IN}	4.5	A
Junction temperature	T _J	150	°C
Lead temperature(Soldering, 10s)	T _L	260	°C
Storage temperature	T _{stg}	-55~150	°C
Surge Protection	Surge	100	V

These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Recommend Operating Conditions

Parameter	Symbol	Value	Unit
VIN supply input voltage range	V _{CC}	2.9~25	V
Operating ambient temperature	T _A	-40~85	°C
Thermal Resistance *1	R _{θJA}	85	°C/W

*1 Surface mounted on FR-4 Board using 2 oz, 1*1 square inch Cu area. PCB board size 1.5*1.5 square inches.

Electrical Characteristics

 (T_A = 25°C, V_{IN} = 5V, C_{IN} = 1μF, C_{OUT} = 1μF, for 5V application, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Basic Operation						
Input Clamp Voltage	V _{IN_CLAMP}	I _{IN} =10mA	33.8	36.5	40.2	V
Quiescent Supply Current	I _Q	V _{IN} = 5V, #EN=0V, No Load		100	210	μA
		V _{IN} = 5V, #EN=1.8V, No Load		25		
OVLO Supply Current (No Load)	I _{OV}	V _{IN} =5V, #EN=0V, V _{OVLO} =2V		80		μA
		V _{IN} =5V, #EN=5V, V _{OVLO} =2V		25		μA
UVLO Threshold Voltage	V _{UVLO}	V _{IN} Rising		2.2	2.8	V
UVLO Hysteresis Voltage	V _{UVLO_HYS} ^{*3}	V _{IN} Falling		0.14		V
Debounce Time	T _{DEB}	Time from V _{IN} rise above V _{UVLO} to V _{OUT} = 0.1 x V _{IN}		20		ms
Soft-Start Time	T _{SS}	Time from V _{IN} rise above V _{UVLO} to #ACOK goes Low		40		ms
Switch Turn-On Time	T _{ON}	R _L =100Ω, C _L =22μF, V _{OUT} from 0.1xV _{IN} to 0.9xV _{IN}		2		ms
Main Switch ON-Resistance	R _{ON}	V _{IN} = 5V, I _{OUT} = 1A		30	39	mΩ
#ACOK Output Low Voltage	V _{OL}	I _{SINK} =1mA		0.1	0.4	V
#ACOK Leakage Current	I _{#ACOK_LEAK}	V _{#ACOK} = 3V	-0.1		0.1	μA
Enable High Voltage	V _{IH_#EN}	V _{IN} = 5V	1.4			V
Enable Low Voltage	V _{IL_#EN}	V _{IN} = 5V			0.4	V
#EN Input Leakage Current	I _{#EN}	V _{IN} = 5V, V _{#EN} =5V		2		μA
		V _{IN} = 5V, V _{#EN} =0V	-1		1	
Over-Voltage Protection						
OVLO Set Threshold	V _{OVLO_TH}	OVLO Voltage Rising	1.17	1.2	1.23	V
OVLO Set Hysteresis	V _{OVLO_Hys} ^{*2*3}	OVLO Voltage Hysteresis		40		mV
Adjustable IN OVP threshold range	V _{OVLO_range}		4		25	V
External OVLO Select Threshold	V _{OVLO_E}	OVLO Voltage Rising		0.25		V
OVLO Select Hysteresis	V _{OVLO_Ehys} ^{*3}			20		mV

Electrical Characteristics

($T_A = 25^\circ\text{C}$, $V_{IN} = 5\text{V}$, $C_{IN} = 1\mu\text{F}$, $C_{OUT} = 1\mu\text{F}$, for 5V application, unless otherwise noted)

Internal OVP Threshold	V_{OVLO_I}	V_{IN} Rising	6.5	6.8	7.1	V
		V_{IN} Hysteresis* ³		0.3		
OVLO Response Time	t_{OVLO} * ³	V_{IN} rising at 1V/0.1 μs , $V_{ovp}=6.8\text{V}$		70		ns
OVLO Input Current	I_{OVLO}	$V_{OVLO} = 2\text{V}$	-0.1		0.1	μA
Output discharge resistance	R_{DCHG}	$V_{OVLO} = 2\text{V}$, $V_{OUT} = 5\text{V}$		150		Ω
Thermal Protection						
Thermal Shutdown	T_{SD}			150		$^\circ\text{C}$
OTP Hysteresis	T_{HYS}			25		$^\circ\text{C}$

*2 If connect a resistor-divider to set different OVLO threshold, then $V_{OVLO_HYS} = 40 \times (1+R1/R2)$ mV.

*3 Guaranteed by design

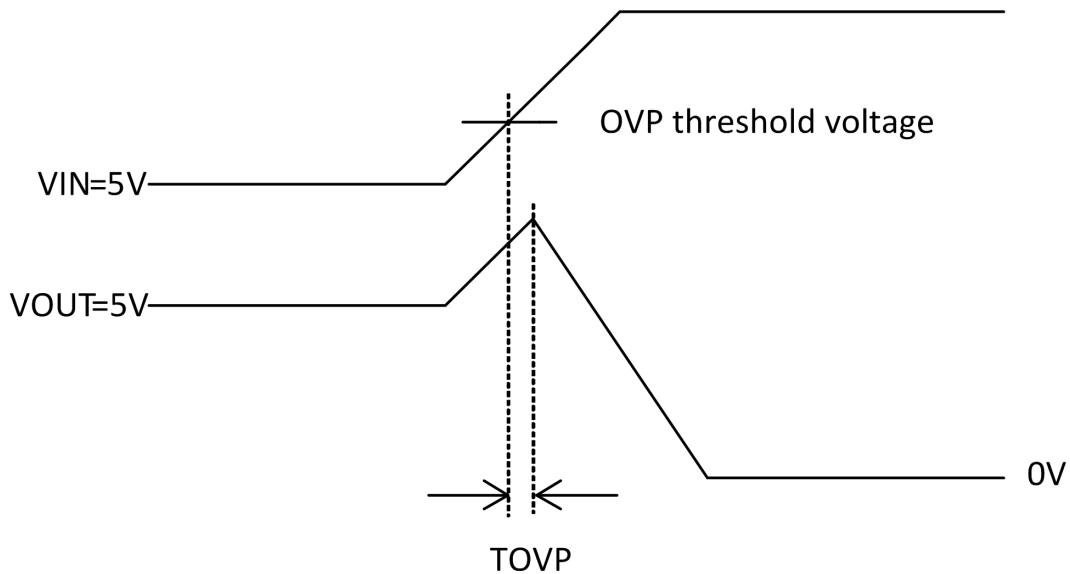
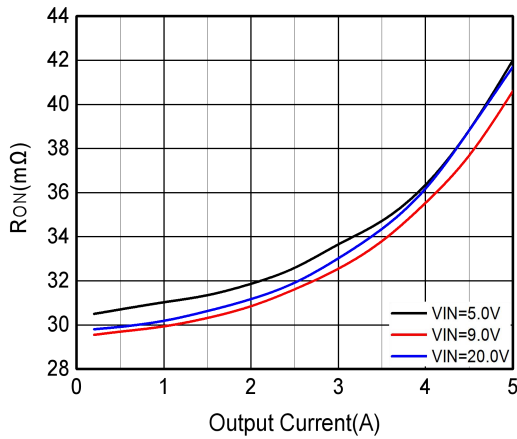
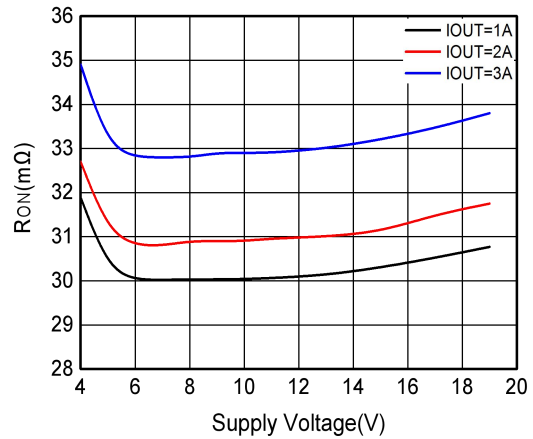
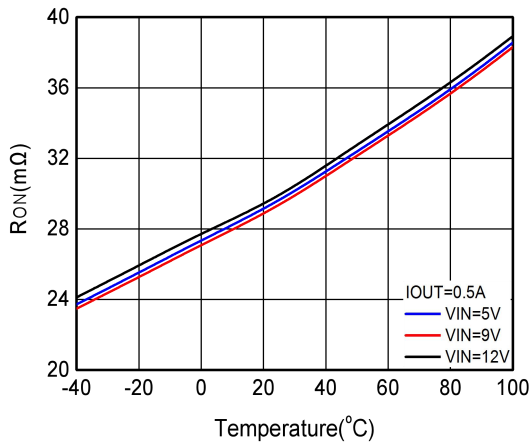
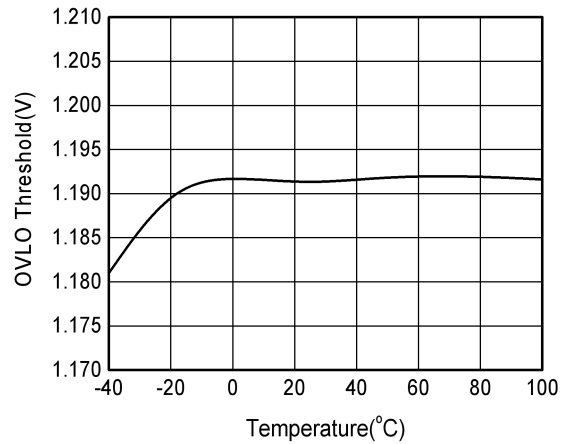
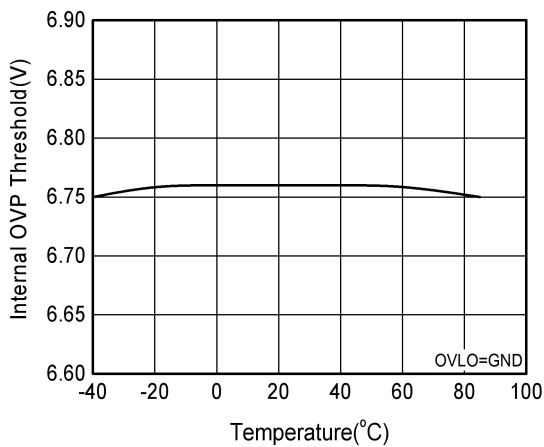
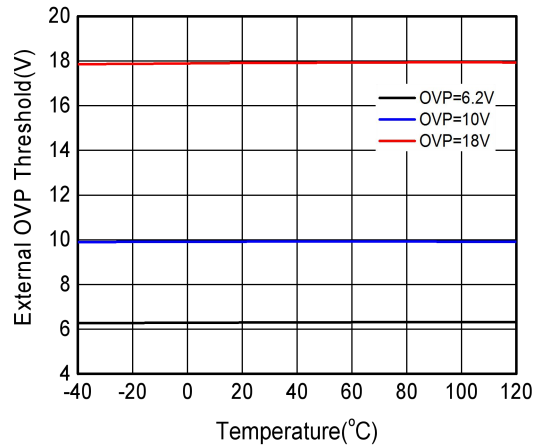
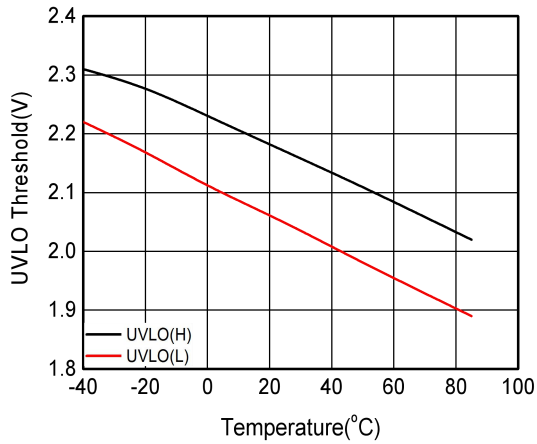
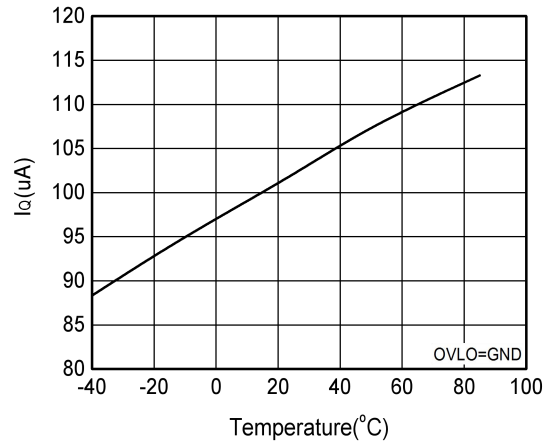


Fig. OVP Response Time Test

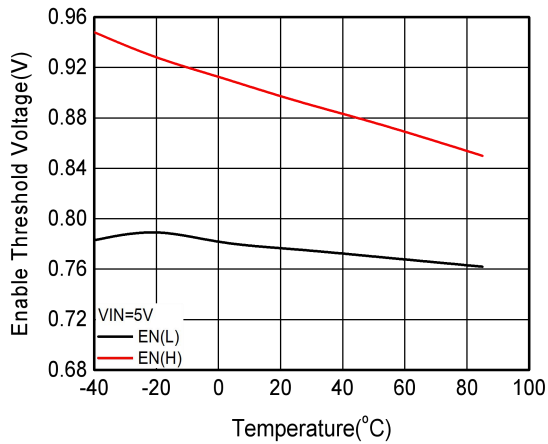
Typical Characteristics ($T_A = 25^\circ\text{C}$, $C_{IN} = 1\mu\text{F}/50\text{V}$, $C_{OUT} = 1\mu\text{F}/50\text{V}$, unless otherwise noted)

 R_{ON} vs. Output Current

 R_{ON} vs. Supply Voltage

 R_{ON} vs. Temperature

OVLO Threshold Voltage vs. Temperature

Internal OVP Threshold Voltage vs. Temperature

External OVP Threshold Voltage vs. Temperature



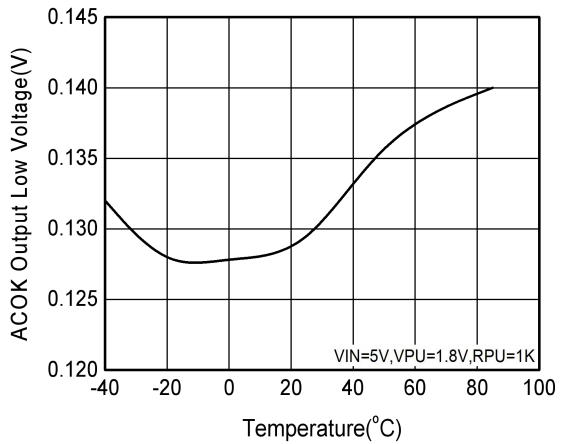
UVLO Threshold Voltage vs. Temperature



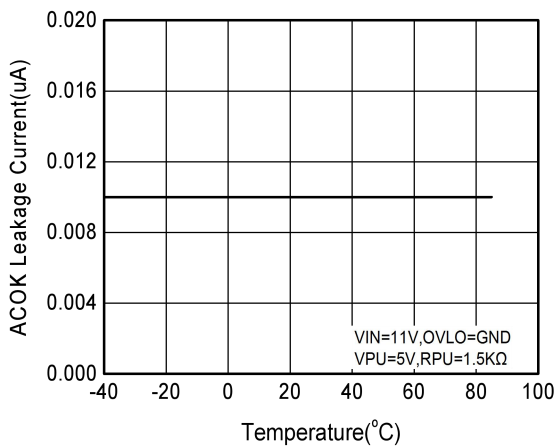
Quiescent Supply Current vs. Temperature



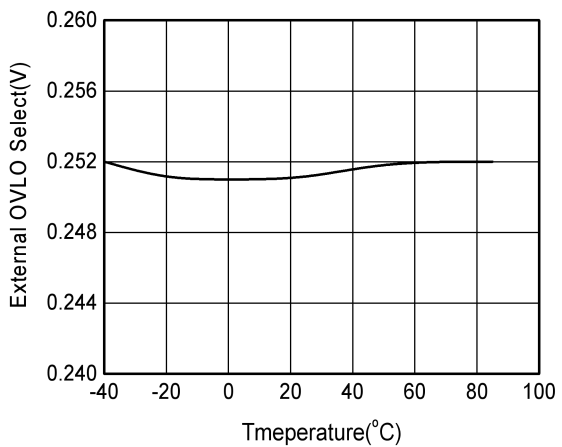
EN Threshold Voltage vs. Temperature



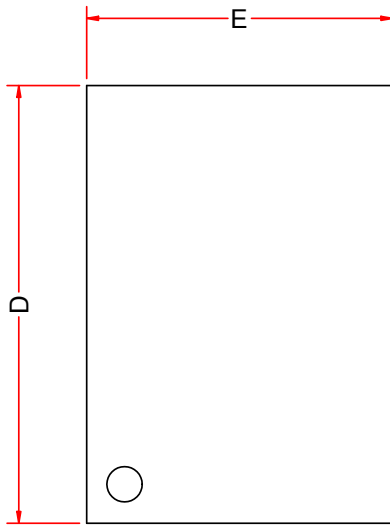
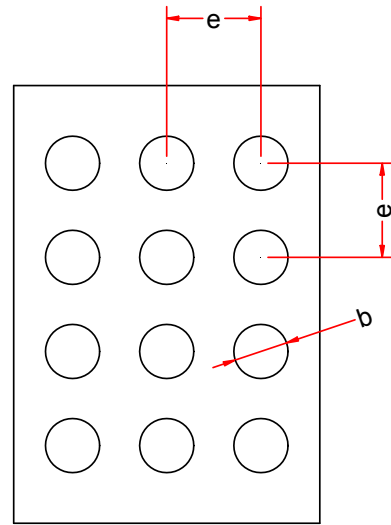
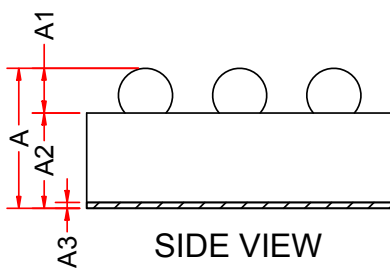
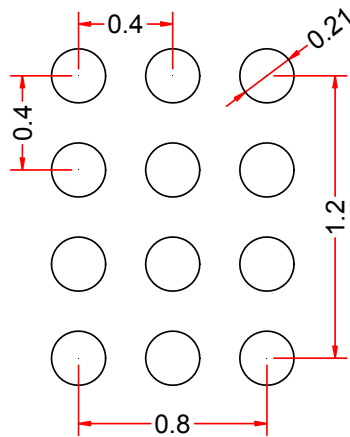
ACOK Output Low Voltage vs. Temperature



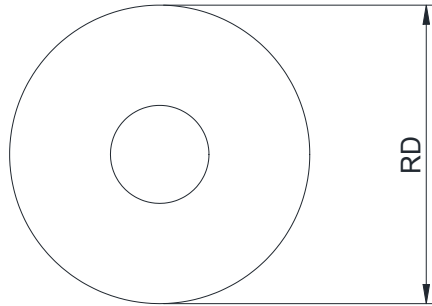
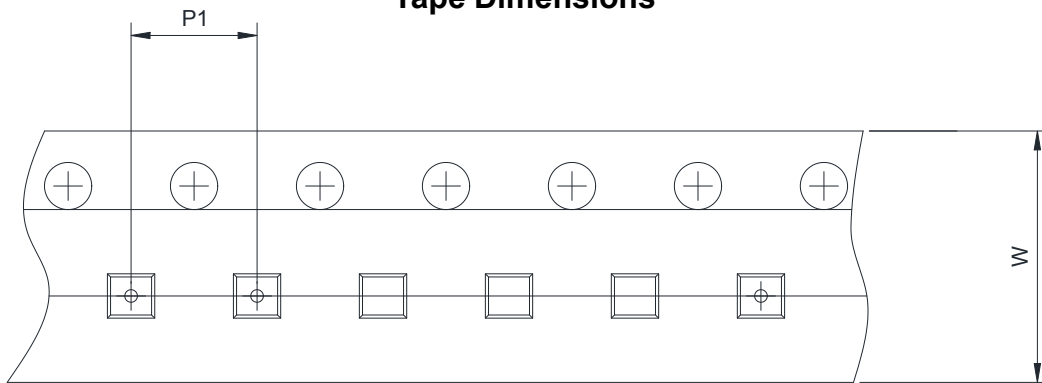
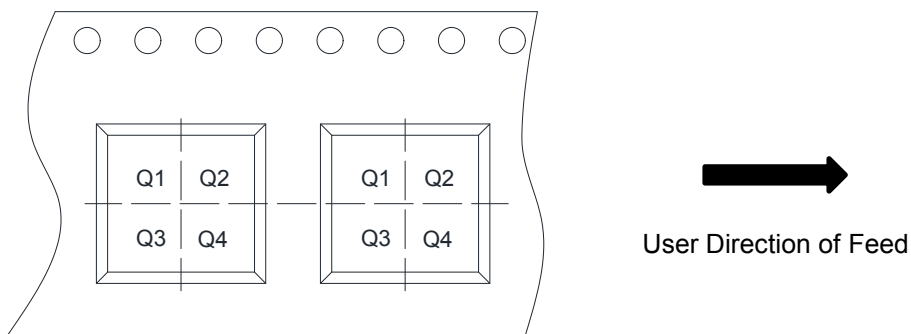
ACOK Leakage Current vs. Temperature



External OVLO Select Voltage vs. Temperature

PACKAGE OUTLINE DIMENSIONS
CSP-12L

TOP VIEW

BOTTOM VIEW

SIDE VIEW

RECOMMENDED LAND PATTERN(unit:mm)

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.54	0.59	0.63
A1	0.17	0.19	0.21
A2	0.37	0.40	0.42
A3	0.025 Ref.		
E	1.14	1.17	1.20
D	1.54	1.57	1.60
b	0.21	0.23	0.25
e	0.40BSC		

TAPE AND REEL INFORMATION
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch		
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm		
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input checked="" type="checkbox"/> 4mm	<input type="checkbox"/> 8mm	
Pin1	Pin1 Quadrant	<input type="checkbox"/> Q1	<input checked="" type="checkbox"/> Q2	<input type="checkbox"/> Q3	<input type="checkbox"/> Q4