General Description

LSP2025 series are CMOS positive voltage linear regulators with low current consumption, high accuracy output, high speed, low dropout voltage and 300mA output. High accuracy output voltage ±1.5% is realized by using laser trimming technology. The charged output capacitor can be discharged with an internal switch by making EN=GND, as a result V_{OUT} quickly returns to the GND level. LSP2025 have both Thermal Shutdown, and Current limit to prevent device damage under the worst of operating conditions. Low ESR capacitors are available for input and output capacitor.

Adjustable output voltage version and fixed output voltage version are available.

Features

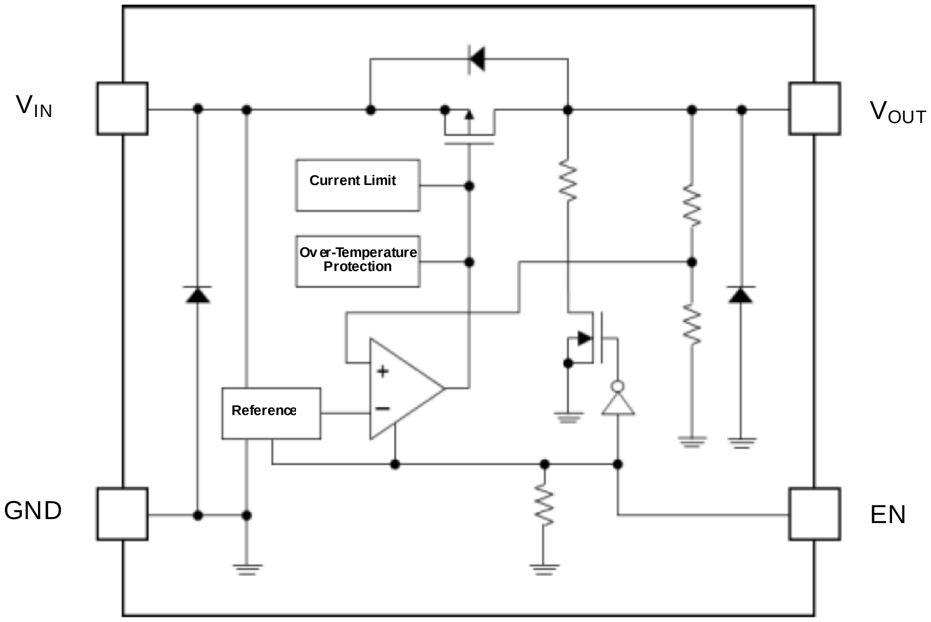
- Fixed output voltage version : 0.8V~5.0V (selectable with a step of 0.05V)
- Adjustable output voltage version : ADJ Reference Voltage=0.6V±1.2%, (Available Vout=0.8V~5.0V)
- Operating input voltage : 1.7V~6.0V
- High accuracy output voltage : ±1.5% (1.35V≦Vout),±20mV (Vout＜1.35V)at +25℃
- Guaranteed output current : 300mA
- Low dropout voltage : Typ. 220mV (output=3.0V, Iout=300mA)
- Low quiescent current : Typ. 60μA
- High ripple rejection : Typ. 75dB at 1KHz
- Low ESR output capacitor : 1.0 μF (1.2V≦Vout),3.3uF(Vout＜1.2V)
- Low ESR input capacitor : 1.0 μF
- Operating temperature range : －40℃to +85℃
- Built-in over-current protector : Limit current : 450mA (Min.)
- Built-in thermal shutdown circuit

Applications

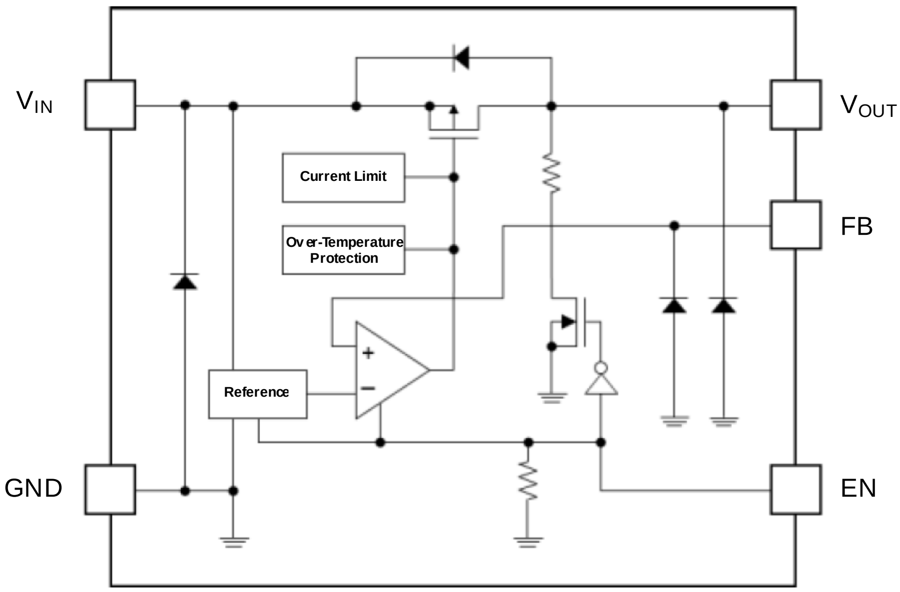
- Battery powered devices
- Portable games
- Cellular phone
- Handheld instruments

Please be aware that an **Important Notice** concerning availability, disclaimers, and use in critical applications of LSC products is at the end of this document.

Block Diagram

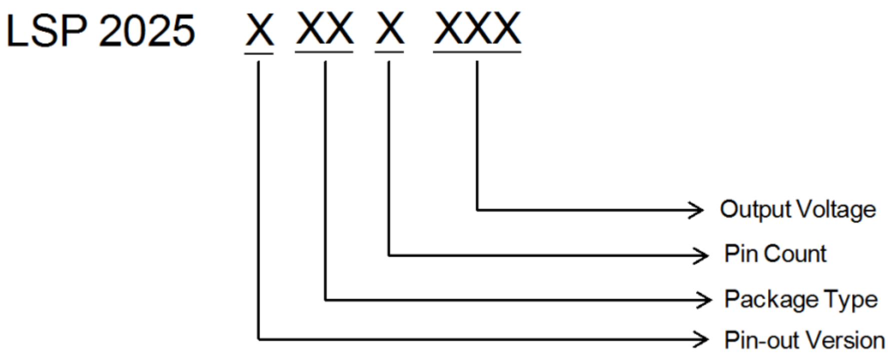


Fixed Output



Adjustable Output

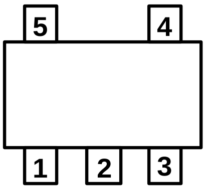
Ordering Information



Pin-out Version	Package Type	Pin Count	Output Voltage
A 1. GND	AA : SOT23	B: 3	ADJ : Adjustable
(SOT23-3) 2. VOUT	AS : SC70	C: 4	080 : 0.8V
3. VIN	AU : SC82	D: 5	100 : 1.0V
	DB : X2DFN1010		120 : 1.2V
A 1. VIN			150 : 1.5V
(SOT23-5) 2. GND			180 : 1.8V
(SC70-5) 3. EN			200 : 2.0V
4. NC			220 : 2.2V
5. VOUT			250 : 2.5V
			280 : 2.8V
B 1. VIN			285 : 2.85V
(SOT23-5) 2. GND			300 : 3.0V
(SC70-5) 3. EN			330 : 3.3V
4. FB			390 : 3.9V
5. VOUT			
A 1. VOUT			
(X2DFN1010-4) 2. GND			
3. EN			
4. VIN			
B 1. EN			
(SC82) 2. GND			
3. VOUT			
4. VIN			

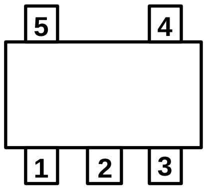
Pin Assignment

SOT23-5L / SC70-5L
Top View



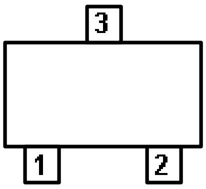
LSP2025AAAD
LSP2025AASD
1. VIN
2. GND
3. EN
4. NC
5. VOUT

SOT23-5L / SC70-5L
Top View



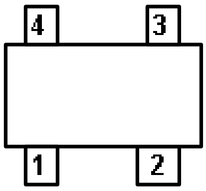
LSP2025BAAD
LSP2025BASD
1. VIN
2. GND
3. EN
4. FB
5. VOUT

SOT23-3L
Top View



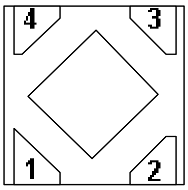
LSP2025AAAB
1. GND
2. VOUT
3. VIN

SC82
Top View



LSP2025BAUC
1. EN
2. GND
3. VOUT
4. VIN

X2DFN1010-4L
Top View



LSP2025ADBC
1. VOUT
2. GND
3. EN
4. VIN

Pin Descriptions

Pin Name	Pin Description
V_{IN}	Voltage input.
GND	Ground
V_{OUT}	LDO Output
FB (Optional)	Feedback Input for Setting the Output Voltage. Connect to an external resistor divider for adjustable output operation.
EN	Chip enable
NC	No connection

Absolute Maximum Ratings

Operate over the "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to such conditions for extended time may still affect the reliability of the device.

Parameter		Symbol	Value	Unit
V_{IN} Pin Voltage		V_{IN}	- 0.3 to 7	V
FB, EN and V_{OUT} pin Voltages		V_{FB}, V_{EN} & V_{OUT}	GND - 0.3 to V_{IN} + 0.3	V
Maximum I_{OUT} Current (Note 1)		I_{OUT}	Internal Limit	mA
Junction Temperature Range		T_J	-40 to +150	°C
Storage Temperature Range		T_{STR}	-55 to +125	°C
Lead Temperature (Soldering, 10 Seconds)		T_{Lead}	260	°C
ESD Withstand Voltage : -Human Body Model (HBM), Model = 2 -Machine Model (MM) Model = B		V_{ESD}	2000 200	V V
Thermal Resistance (Junction to Ambient)	SOT23-3L	θ_{JA}	250	°C/W
	SOT23-5L		250	
	SC70-5L		400	
	SC82		400	
	X2DFN1010-4		190	
Power Dissipation	SOT23-3L	P_D	400	mW
	SOT23-5L		400	
	SC70-5L		250	
	SC82		250	
	X2DFN1010-4		520	
Moisture Sensitivity		MSL	Please refer the MSL label on the IC package bag/carton for detail	

Note 1 : The I_{OUT} of the LDO will be limited by the thermal protection , if the PCB design can't dissipate the heat generated by the LDO

Note 2 : $R_{\theta JA}$ is highly dependent on the PCB heat sink area.

Recommended Operating Conditions

Characteristics	Symbol	Min	Max	Unit
Supply Input Voltage	V_{IN}	1.7	6.0	V
Operating Junction Temperature Range	T_J	-40	+120	^oC
Operating Ambient Temperature Range	T_A	-40	+85	^oC

Note 3 : If the IC experienced OTP, then the temperature may need to drop to < OTP recover temperature to let the IC recover.

Electrical Characteristics

(V_{IN}=Set V_{OUT}+1V, I_{OUT}=1mA, C_{IN}=C_{OUT} =1µF, T_A=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Units
Output Voltage	V_{OUT}	V_{IN} = V_{OUT} +1.0V, I_{OUT} = 30mA	V_{OUT} < 1.35V	V_{OUT} -20	V_{OUT}	V_{OUT} +20	mV
			V_{OUT} ≥ 1.35V	V_{OUT} ×0.985	V_{OUT}	V_{OUT} ×1.015	V
ADJ Reference Voltage	V_{ADJ}			0.593	0.600	0.607	V
Output current	I_{OUT}	V_{IN} = V_{OUT} + 1.0V	0.8V ≤ V_{OUT} ≤ 1.15V	300	-	-	mA
			1.2V ≤ V_{OUT} ≤ 1.65V	300	-	-	
			1.7V ≤ V_{OUT} ≤ 2.25V	300	-	-	
			2.3V ≤ V_{OUT} ≤ 2.85V	300	-	-	
			2.9V ≤ V_{OUT} ≤ 3.45V	300	-	-	
			3.5V ≤ V_{OUT} ≤ 4.05V	300	-	-	
			4.0V ≤ V_{OUT} ≤ 5.00V	300	-	-	
Dropout Voltage (Note3)	V_{DROP}	I_{OUT} = 300mA (V≥1.7V)	0.8V ≤ V_{OUT} ≤ 1.15V	-	-	900	mV
			1.2V ≤ V_{OUT} ≤ 1.65V	-	-	500	
			1.7V ≤ V_{OUT} ≤ 2.25V	-	305	400	
			2.3V ≤ V_{OUT} ≤ 2.85V	-	250	340	
			2.9V ≤ V_{OUT} ≤ 3.45V	-	220	300	
			3.5V ≤ V_{OUT} ≤ 4.05V	-	210	290	
			4.0V ≤ V_{OUT} ≤ 5.00V	-	205	285	
Quiescent Current	I_Q	V_{IN} = V_{OUT} +1.0V, I_{OUT}= 0mA		-	60	90	µA
Shutdown Current	I_{SD}	V_{EN}=0V		-	0.02	0.2	µA
Load Regulation (ΔV_{OUT} / V_{OUT})	ΔV_{LOAD}	V_{IN} = V_{OUT} +1.0V, I_{OUT} = 0.1mA ~ 300mA	V_{OUT} < 1.35V	-	0.1	0.7	%
			1.35V ≤ V_{OUT} < 2.30V	-	0.1	0.6	
			2.30V ≤ V_{OUT}	-	0.1	0.5	

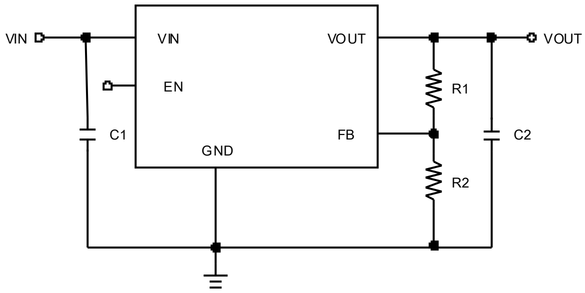
Electrical Characteristics (Contd.)

(V_{IN}=Set V_{OUT}+1V, I_{OUT}=1mA, C_{IN}=C_{OUT} =1μF, T_A=25°C, unless otherwise noted)

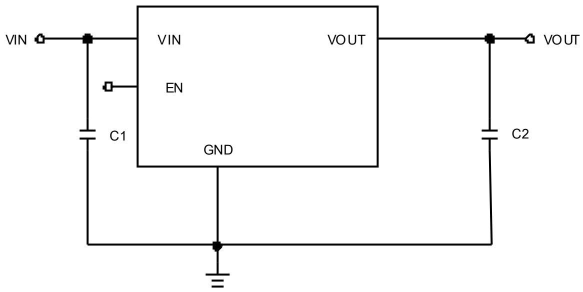
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Line Regulation V_{OUT} /(V_{IN} * V_{OUT})	ΔV_{LINE}	V_{OUT} + 1.0V ≤ V_{IN} ≤ 6.0V, I_{OUT} = 30mA	-	0.01	0.1	%/V
Ripple Rejection (Note 7)	PSRR	V_{IN} = V_{OUT} +1.0V, f = 1KHz, ΔV_{RIP} = 0.5V_{P-P}, I_{OUT} = 30mA	-	75	-	dB
Current Limit (Note 5)	I_{LIMIT}	V_{IN} = V_{OUT} +1.0V	450	600	-	mA
Short Circuit Current	I_{short}	V_{IN} = V_{OUT} +1.0V, V_{OUT} =0V	-	100	-	mA
V_{OUT} Temperature Coefficient (Note 7)	T_C	I_{OUT} = 30mA, T_A = -40°C ~ +85°C	-	±20	-	ppm/ °C
ADJ Input Bias Current	I_{ADJ}	Adj=0.6V	-0.1	-	0.1	μA
Enable High Level Voltage	V_{ENH}		1.2	-	6.0	V
Enable Low Level Voltage	V_{ENL}		-	-	0.3	V
Enable High Level Current	I_{ENH}	V_{EN} = V_{IN} =6.0V	0.3	-	5	μA
Enable Low Level Current	I_{ENL}	V_{EN} = 0V	-0.1	-	0.1	μA
C_{OUT} auto-discharge resistance	R_{DIS}	V_{IN}= 6.0V, V_{OUT} = 4.0V, V_{EN} = 0V	-	100	-	Ω
Thermal Shutdown (Note 6)	T_S	Shutdown, temperature increasing	-	150	-	°C
Thermal Shutdown Hysteresis (Note 7)	T_{SH}	Release, temperature decreasing	-	30	-	°C

Note 3: Minimum V_{IN} voltage is defined by output adds a dropout voltage.
Note 4. Current limit and short circuit current are measured at constant junction temperature by using pulsed testing with a low ON time.
Note 5. Load Regulation is measured at constant junction temperature by using pulsed testing with a low ON time.
Note 6. Guarantee by design. Not test when manufacture.

Application Circuit



Adjustable Output
*(*Optional Pin or Component)*



Fixed Output
*(*Optional Pin or Component)*

Input and Output Capacitor Requirements

X5R- and X7R-type ceramic capacitors are recommended because these components have minimal variation in value and equivalent series resistance (ESR) over temperature and will offer the best AC performance. LSP2025 is stable with an output capacitor to ground. 3.3uF or greater in case of $V_{OUT} < 1.2V$.

1uF or greater in case of $V_{OUT} \geqq 1.2V$.

And an input capacitor is also important for the stability of LSP2025. Place 1uF or greater between V_{IN} and ground. Input and output capacitors should be placed as close to LSP2025 as possible.

Minimum Capacitance	$V_{OUT} < 1.2V$	$1.2V \leqq V_{OUT}$
C_{IN}	≧ 1uF	≧ 1uF
C_{OUT}	≧ 3.3uF	≧ 1uF

V_{OUT} setting of Adjustable Version

Adjustable version uses external feedback resistors to generate an output voltage. The output voltage are available from 0.8V to 5V. V_{ADJ} is trimmed to 0.6V and V_{OUT} is given by the following equation.

$V_{OUT} = V_{ADJ} * (1 + R_1 / R_2)$

Feedback resistors R_1 and R_2 should be high enough to keep quiescent current low, but increasing $R_1 + R_2$ will reduce stability. In general, R_1 and R_2 in the tens of kohm will produce adequate stability. In the same way as capacitors, place R_1 and R_2 close to LSP2025. Because It was the negative feedback loop of LDO, The distance from resistances to LSP2025. influences the stability and other characteristics. To improve stability characteristics, keep parasitic on the ADJ pin to a minimum, and lower R_1 and R_2 values.

EN pin

EN pin is Active high. When EN pin is opened or is forced to be low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this standby state, the current consumption decreases to 0.2uA maximum at room temperature. EN pin is pulled down by 4MΩ resistance internally.

Internal Current Limit

LSP2025 has internal over load current limit protection circuit, which monitors and controls the pass transistor's gate voltage, limiting the output current to 0.6A (Typ.). So, against excessive load, LSP2025 limits it internally and the output voltage falls down.

Finally, when the output is shorted to GND level, the Pch MOS pass transistor current is limited to 100mA.

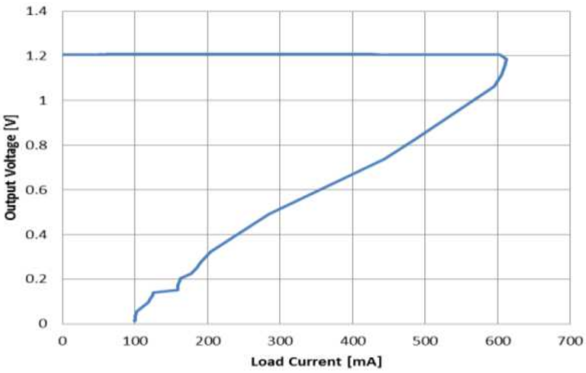
This is Short circuit current (I_{SHORT}).

Thermal Shutdown

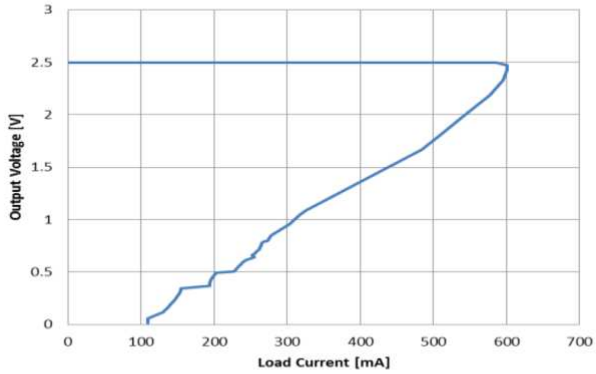
LSP2025 has thermal shutdown circuit internally. This limits total power dissipation in LSP2025. When the junction temperature T_J reaches approximately 150℃, the PMOS pass transistor shuts off the load current and allows LSP2025 to cool. When the junction temperature T_J falls to approximately 120℃, LSP2025 restart the regulation.

Typical Characteristics

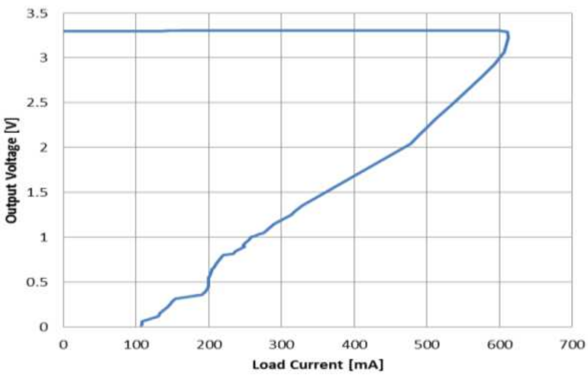
Output Voltage vs. Output Current
V_{OUT}=1.2V, V_{EN}=V_{IN}=2.2V, C_{IN}=C_{OUT}=1uF, T_A=25°C



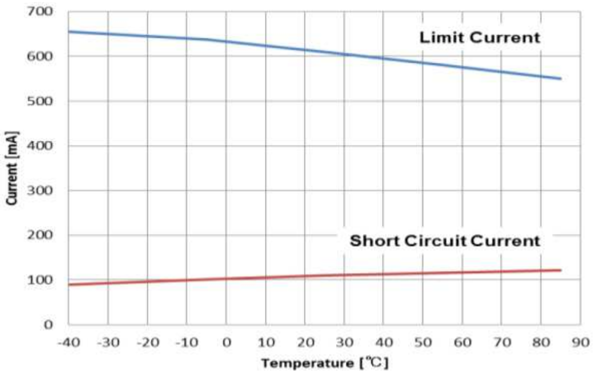
Output Voltage vs. Output Current
V_{OUT}=2.5V, V_{EN}=V_{IN} = 3.5V, C_{IN}=C_{OUT}=1uF, T_A=25°C



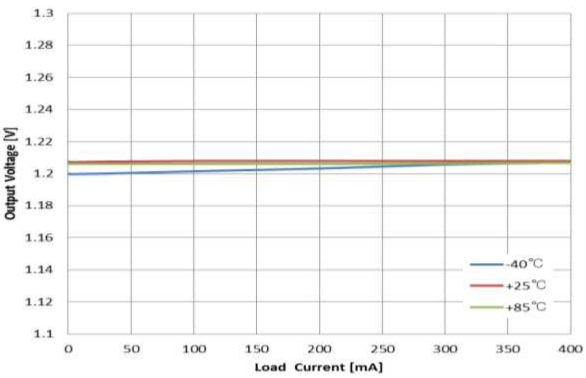
Output Voltage vs. Output Current
V_{OUT}=3.3V, V_{EN}=V_{IN}=4.3V, C_{IN}=C_{OUT}=1uF, T_A=25°C



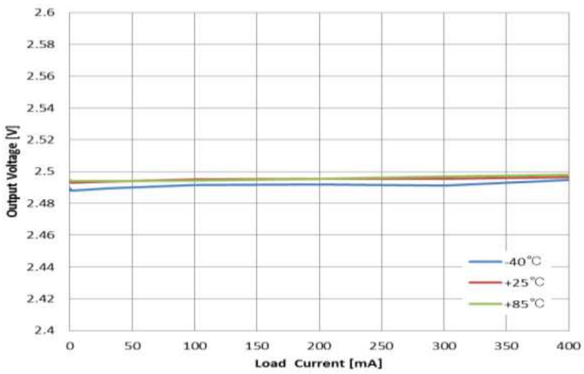
Limit Current, Short Circuit Current vs. Temperature



Load Regulation
V_{OUT}=1.2V, V_{EN}=V_{IN}=2.2V, C_{IN}=C_{OUT}=1uF

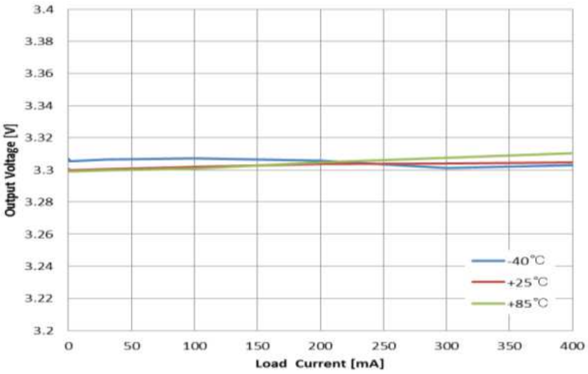


Load Regulation
V_{OUT}=2.5V, V_{EN}=V_{IN}=3.5V, C_{IN}=C_{OUT}=1uF

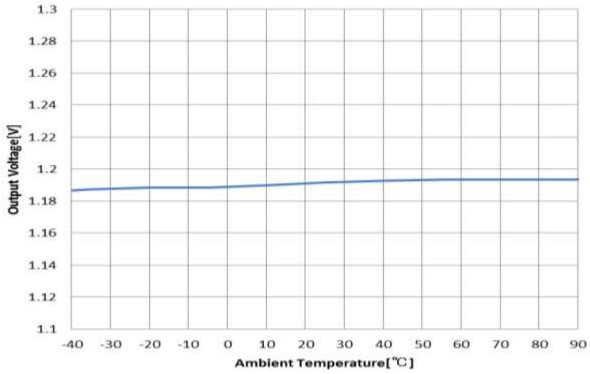


Typical Characteristics (Contd.)

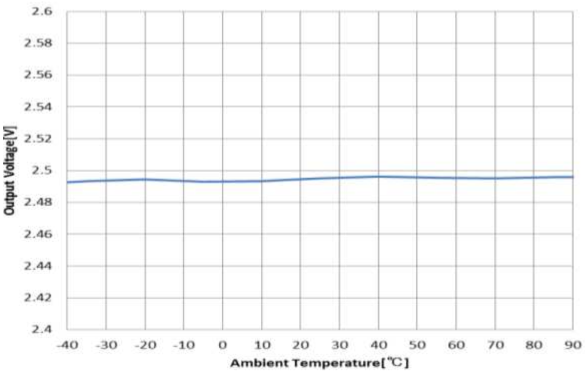
Load Regulation
V_{OUT}=3.3V, V_{EN}=V_{IN}=4.3V, C_{IN}=C_{OUT}=1uF



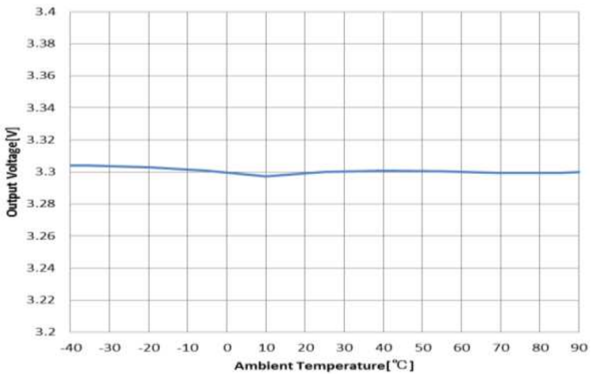
Output Voltage vs. Temperature
V_{OUT}=1.2V, V_{EN}=V_{IN}=2.2V, C_{IN}=C_{OUT}=1uF, I_{OUT}=30mA



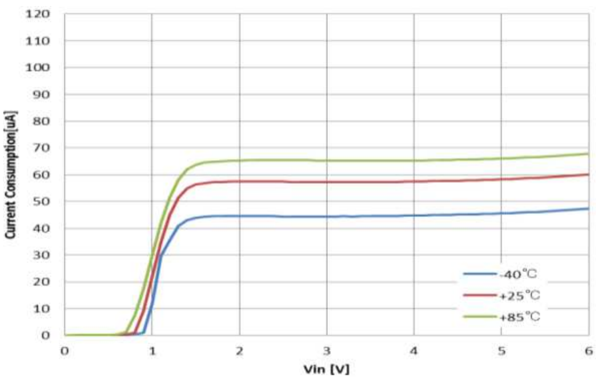
Output Voltage vs. Temperature
V_{OUT}=2.5V, V_{EN}=V_{IN}=3.5V, C_{IN}=C_{OUT}=1uF, I_{OUT}=30mA



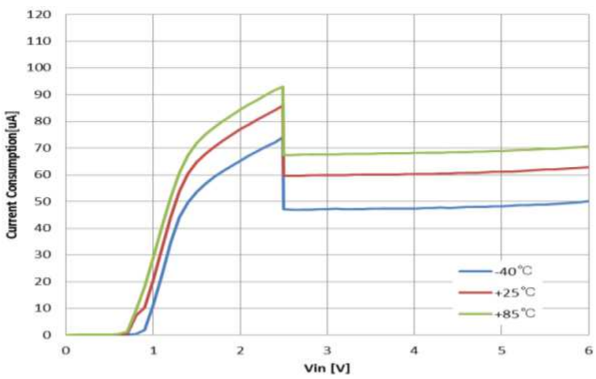
Output Voltage vs. Temperature
V_{OUT}=3.3V, V_{EN}=V_{IN}=4.3V, C_{IN}=C_{OUT}=1uF, I_{OUT}=30mA



Current Consumption vs. Input Voltage
V_{OUT}=1.2V, V_{EN}=V_{IN}, C_{IN}=C_{OUT}=1uF



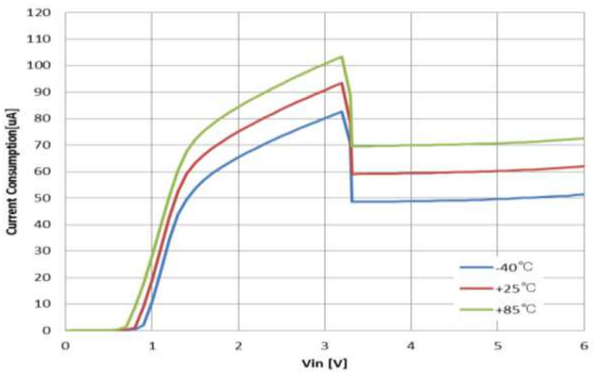
Current Consumption vs. Input Voltage
V_{OUT}=2.5V, V_{EN}=V_{IN}, C_{IN}=C_{OUT}=1uF



Typical Characteristics (Contd.)

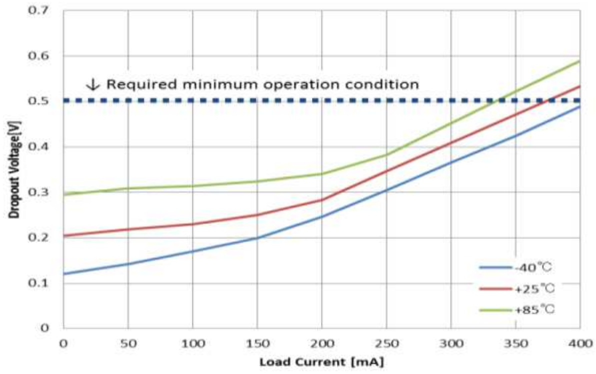
Current Consumption vs. Input Voltage

V_{OUT}=3.3V, V_{EN}=V_{IN}, C_{IN}=C_{OUT}=1uF



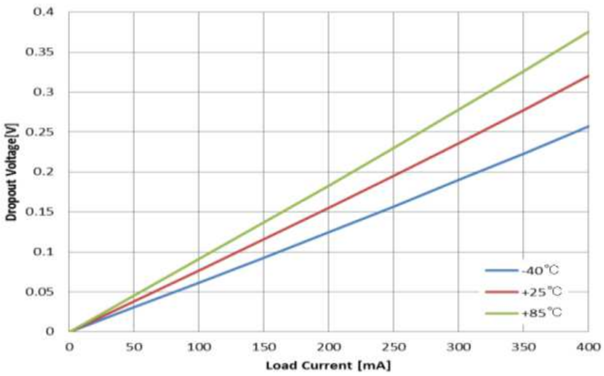
Dropout Voltage vs. Load Current

V_{OUT}=1.2V, V_{EN}=V_{IN}, C_{IN}=C_{OUT}=1uF



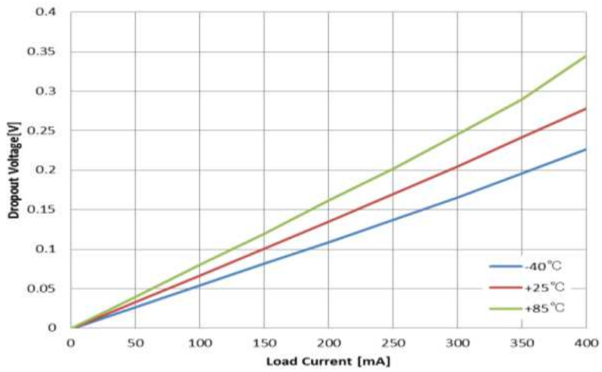
Dropout Voltage vs. Load Current

V_{OUT}=2.5V, V_{EN}=V_{IN}, C_{IN}=C_{OUT}=1uF



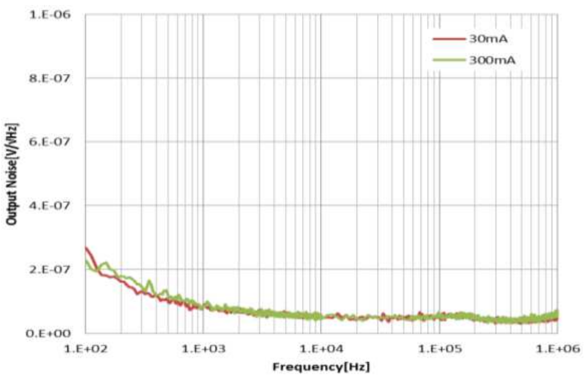
Dropout Voltage vs. Load Current

V_{OUT}=3.3V, V_{EN}=V_{IN}, C_{IN}=C_{OUT}=1uF



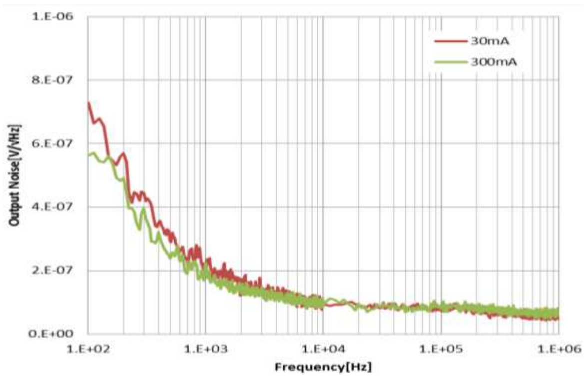
Output Noise vs. Frequency

V_{OUT}=1.2V, V_{EN}=V_{IN}=2.2V, C_{IN}=C_{OUT}=1uF, T_A=25°C



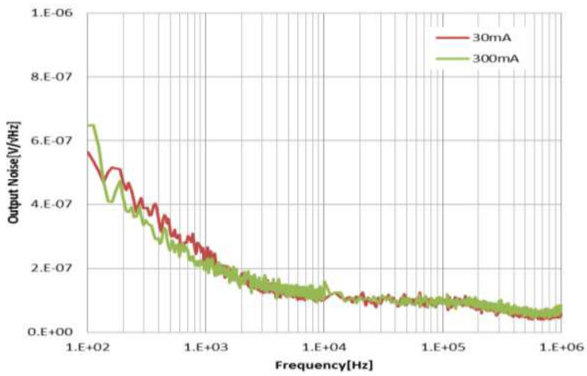
Output Noise vs. Frequency

V_{OUT}=2.5V, V_{EN}=V_{IN}=3.5V, C_{IN}=C_{OUT}=1uF, T_A=25°C

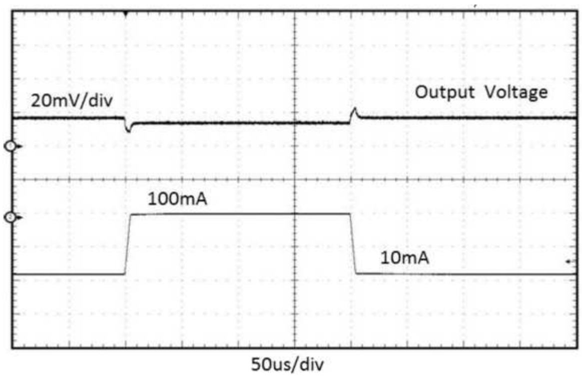


Typical Characteristics (Contd.)

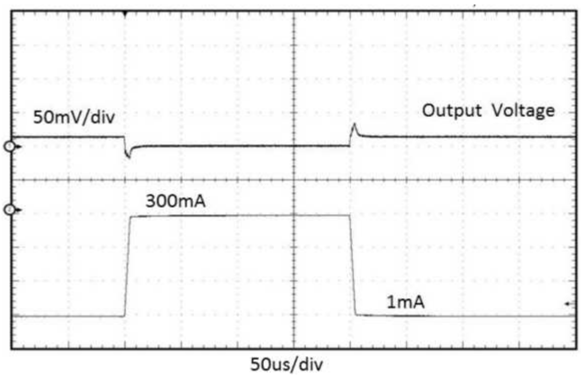
Output Noise vs. Frequency
V_{OUT}=3.3V, V_{EN}=V_{IN}=4.3V, C_{IN}=C_{OUT}=1uF, T_A=25°C



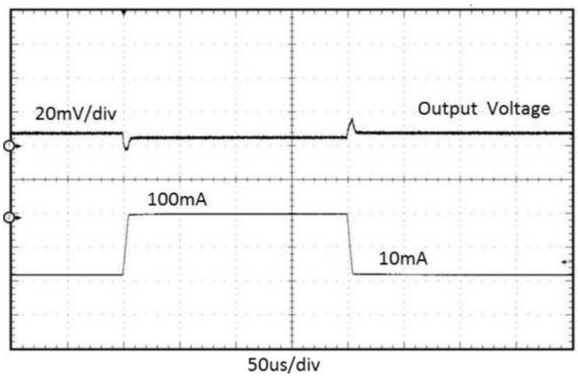
Load Transient Response
V_{OUT}=1.2V, V_{EN}=V_{IN}=2.2V, C_{IN}=C_{OUT}=1uF, T_A=25°C
I_{OUT}=10mA~100mA, T_R=T_F=5us



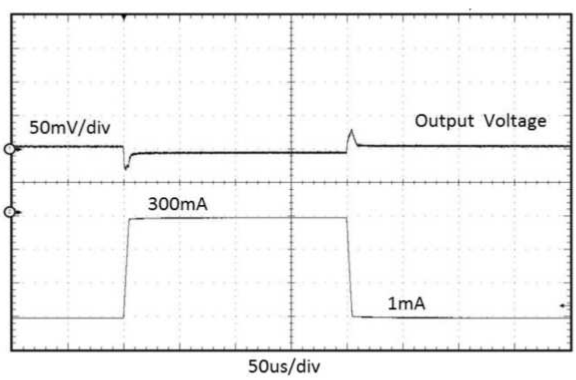
Load Transient Response
V_{OUT}=1.2V, V_{EN}=V_{IN}=2.2V, C_{IN}=C_{OUT}=1uF, T_A=25°C
I_{OUT}=1mA~300mA, T_R=T_F=5us



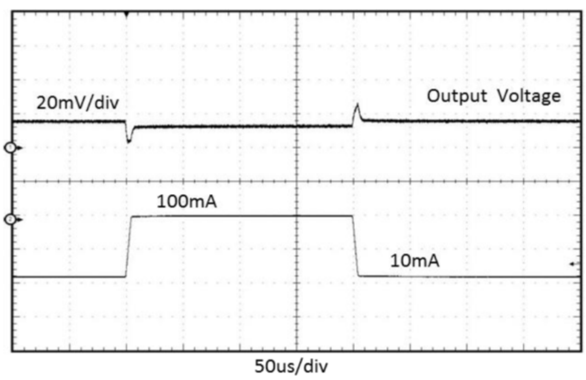
Load Transient Response
V_{OUT}=2.5V, V_{EN}=V_{IN}=3.5V, C_{IN}=C_{OUT}=1uF, T_A=25°C
I_{OUT}=10mA~100mA, T_R=T_F=5us



Load Transient Response
V_{OUT}=2.5V, V_{EN}=V_{IN}=3.5V, C_{IN}=C_{OUT}=1uF, T_A=25°C
I_{OUT}=1mA~300mA, T_R=T_F=5us

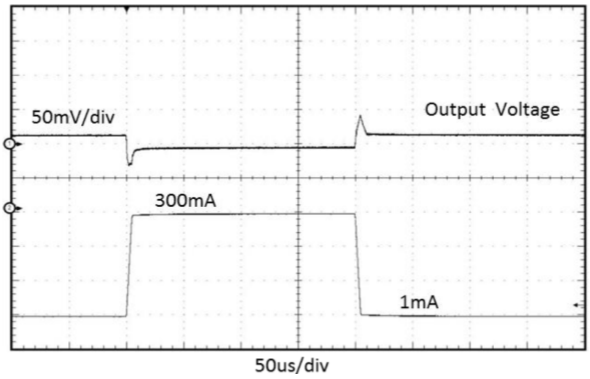


Load Transient Response
V_{OUT}=3.3V, V_{EN}=V_{IN}=4.3V, C_{IN}=C_{OUT}=1uF, T_A=25°C
I_{OUT}=10mA~100mA, T_R=T_F=5us

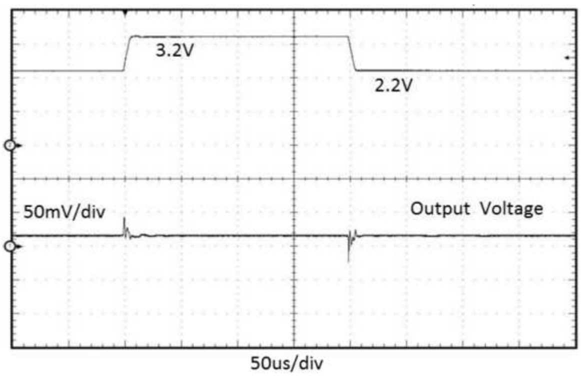


Typical Characteristics (Contd.)

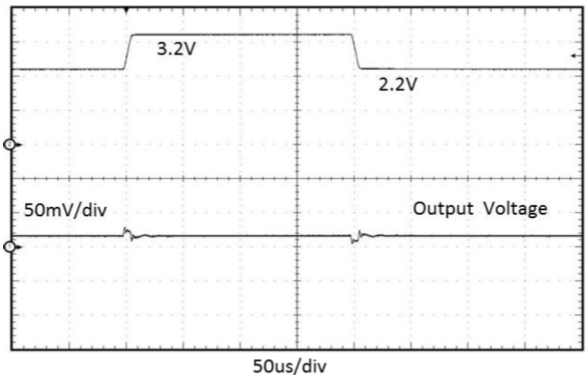
Load Transient Response
V_{OUT}=3.3V, V_{EN}=V_{IN}=4.3V, C_{IN}=C_{OUT}=1uF, T_A=25°C
I_{OUT}=1mA~300mA, T_R=T_F=5us



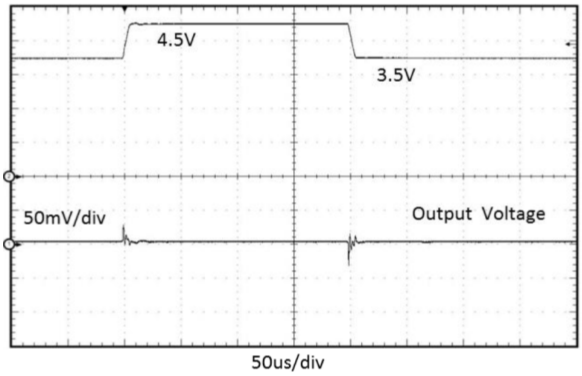
Line Transient Response
V_{OUT}=1.2V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_A=25°C,
V_{EN}=V_{IN}=2.2~3.2V, T_R=T_F=5us



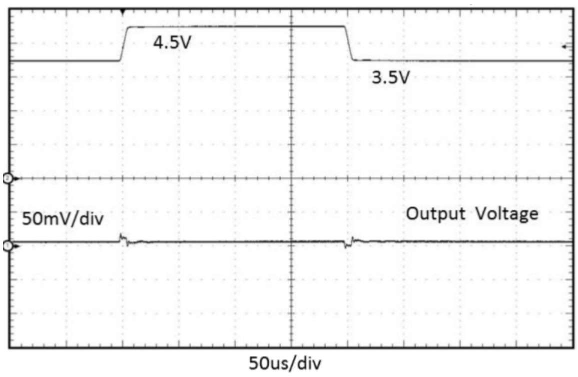
Line Transient Response
V_{OUT}=1.2V, I_{OUT}=300mA, C_{IN}=C_{OUT}=1uF, T_A=25°C,
V_{EN}=V_{IN}=2.2~3.2V, T_R=T_F=5us



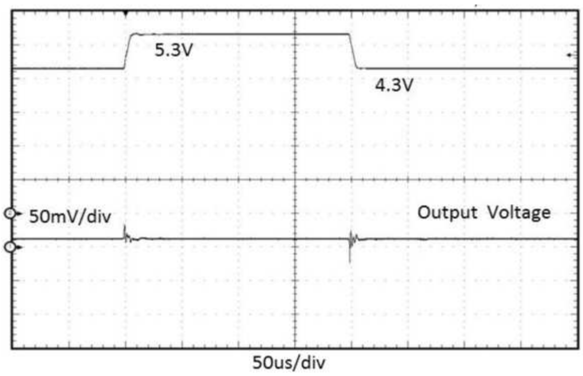
Line Transient Response
V_{OUT}=2.5V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_A=25°C,
V_{EN}=V_{IN}=3.5~4.5V, T_R=T_F=5us



Line Transient Response
V_{OUT}=2.5V, I_{OUT}=300mA, C_{IN}=C_{OUT}=1uF, T_A=25°C,
V_{EN}=V_{IN}=3.5~4.5V, T_R=T_F=5us

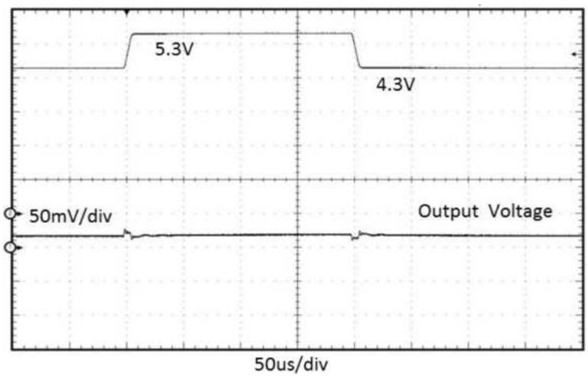


Line Transient Response
V_{OUT}=3.3V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_A=25°C,
V_{EN}=V_{IN}=4.3~5.3V, T_R=T_F=5us

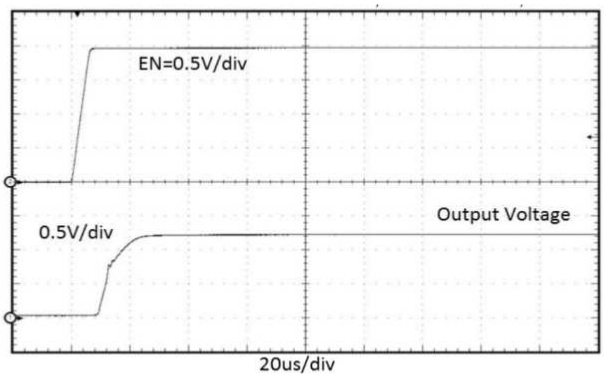


Typical Characteristics (Contd.)

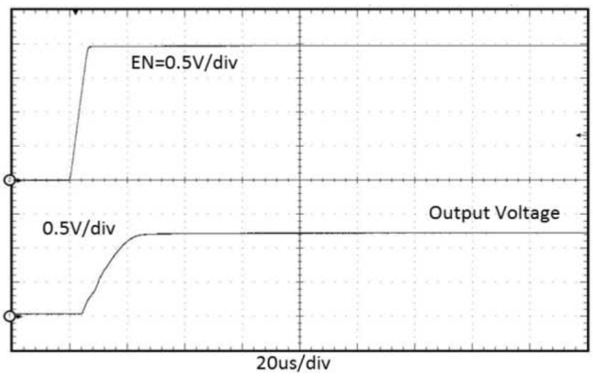
Line Transient Response
V_{OUT}=3.3V, I_{OUT}=300mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{EN}=V_{IN}=4.3~5.3V, T_R=T_F=5us



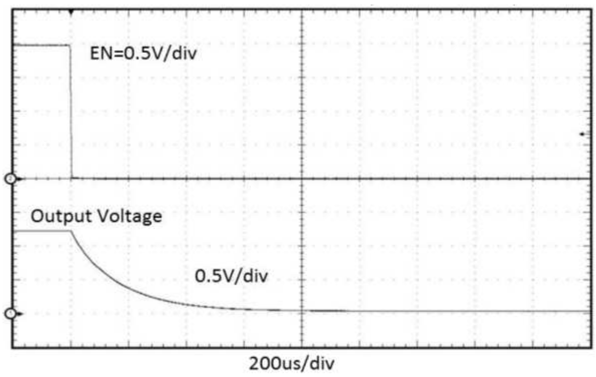
EN Transient Response
V_{OUT}=1.2V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=2.2V, V_{EN}=0→2V, T_R=5us



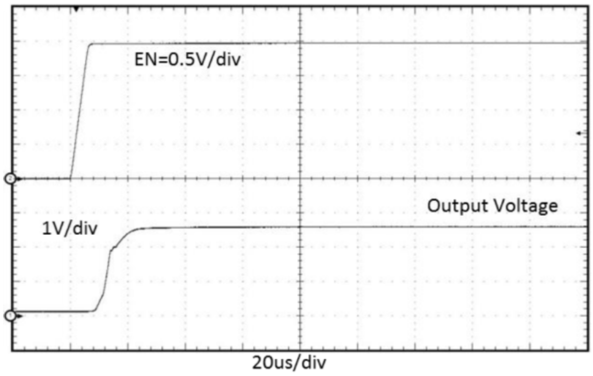
EN Transient Response
V_{OUT}=1.2V, I_{OUT}=100mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=2.2V, V_{EN}=0→2V, T_R=5us



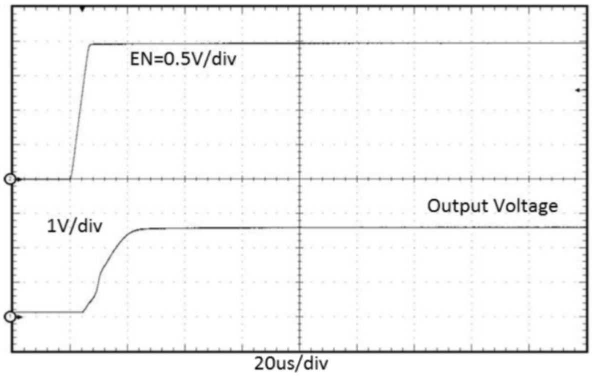
EN Transient Response
V_{OUT}=1.2V, I_{OUT}=0mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=2.2V, V_{EN}=2→0V, T_F=5us



EN Transient Response
V_{OUT}=2.5V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=3.5V, V_{EN}=0→2V, T_R=5us



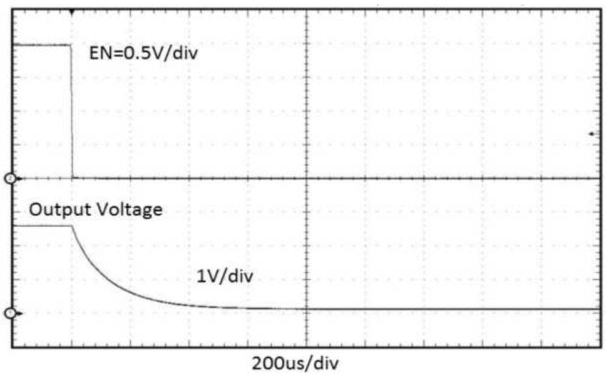
EN Transient Response
V_{OUT}=2.5V, I_{OUT}=100mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=3.5V, V_{EN}=0→2V, T_R=5us



Typical Characteristics (Contd.)

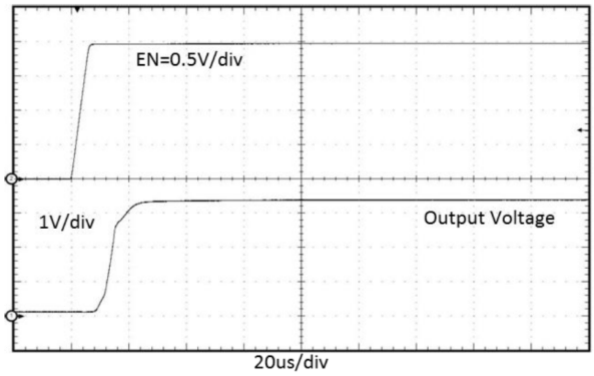
EN Transient Response

V_{OUT}=2.5V, I_{OUT}=0mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=3.5V, V_{EN}=2→0V, T_F=5us



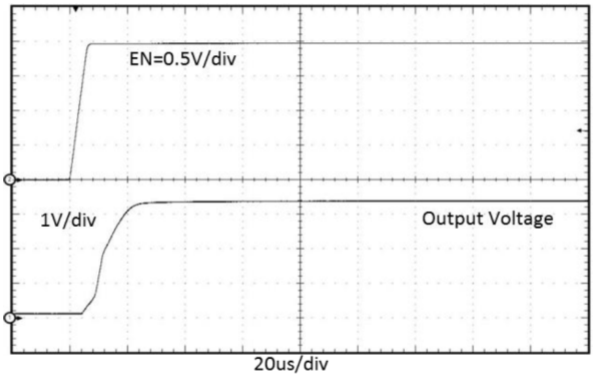
EN Transient Response

V_{OUT}=3.3V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=4.3V, V_{EN}=0→2V, T_R=5us



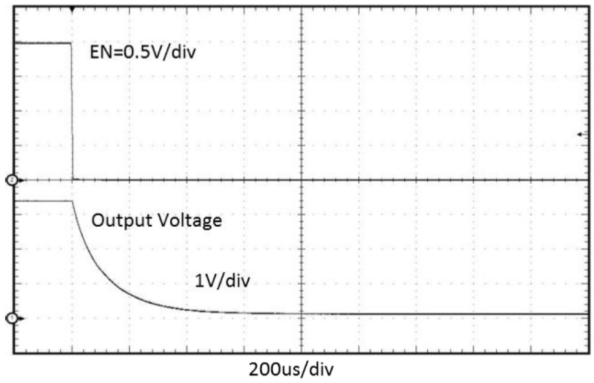
EN Transient Response

V_{OUT}=3.3V, I_{OUT}=100mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=4.3V, V_{EN}=0→2V, T_R=5us



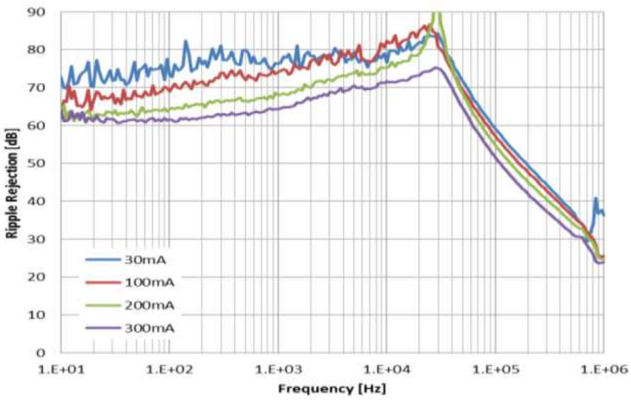
EN Transient Response

V_{OUT}=3.3V, I_{OUT}=0mA, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C,
V_{IN}=4.3V, V_{EN}=2→0V, T_F=5us



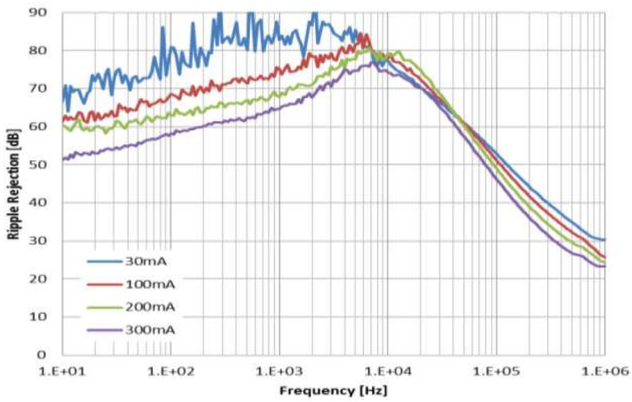
Ripple Rejection vs. Frequency

V_{OUT}=1.2V, V_{EN}=V_{IN}=2.2V, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C



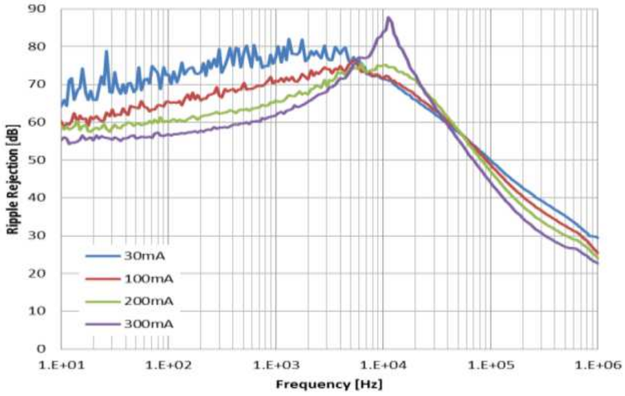
Ripple Rejection vs. Frequency

V_{OUT}=2.5V, V_{EN}=V_{IN}=3.5V, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C



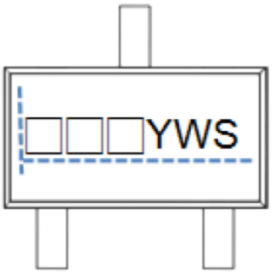
Typical Characteristics (Contd.)

Ripple Rejection vs. Frequency
V_{OUT}=3.3V, V_{EN}=V_{IN}=4.3V, C_{IN}=C_{OUT}=1uF, T_A=25^{O}C



Marking Information

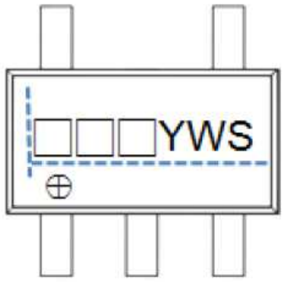
(1) SOT23-3L



1) □□□ = Marking Name
   A14 = LSP2025AAAB080
   A15 = LSP2025AAAB100
   A1A = LSP2025AAAB120
   A1B = LSP2025AAAB150
   A1M = LSP2025AAAB180
   A17 = LSP2025AAAB200
   A1C = LSP2025AAAB250
   A1N = LSP2025AAAB280
   A1W = LSP2025AAAB285
   A1X = LSP2025AAAB300
   1A1 = LSP2025AAAB310
   A1O = LSP2025AAAB330
   A1Y = LSP2025AAAB390

2) YWS = Date Code
   Y = Year
   W = Week
   S = Internal Code

(2) SOT23-5L

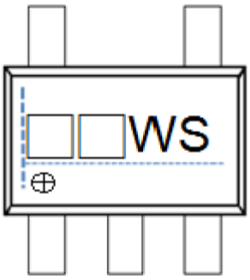


1) □□□ = Marking Name
   A1D = LSP2025AAAD080
   A1R = LSP2025AAAD100
   A1E = LSP2025AAAD120
   A1F = LSP2025AAAD150
   A1G = LSP2025AAAD180
   A1T = LSP2025AAAD200
   A1H = LSP2025AAAD250
   A1J = LSP2025AAAD280
   A1K = LSP2025AAAD285
   A1S = LSP2025AAAD300
   1AA = LSP2025AAAD310
   A1L = LSP2025AAAD330
   A1U = LSP2025AAAD390
   A1P = LSP2025BAADADJ

2) YWS = Date Code
   Y = Year
   W = Week
   S = Internal Code

Marking Information (Contd.)

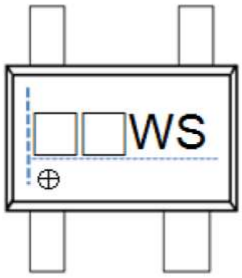
(3) SC70-5L (SOT353)



1) □□ = Marking Name
AB = LSP2025AASD080
AY = LSP2025AASD100
5J = LSP2025AASD120
5K = LSP2025AASD150
AW = LSP2025AASD180
5L = LSP2025AASD200
5M = LSP2025AASD250
AC = LSP2025AASD280
AD = LSP2025AASD285
5N = LSP2025AASD300
5H = LSP2025AASD310
AE = LSP2025AASD330
5O = LSP2025AASD390
AX = LSP2025BASDADJ

2) WS = Date Code
W = Week
S = Internal Code

(4) SC82 (SOT343R)

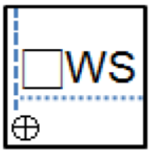


1) □□ = Marking Name
5P = LSP2025BAUC080
5R = LSP2025BAUC100
5S = LSP2025BAUC120
5T = LSP2025BAUC150
AF = LSP2025BAUC180
5U = LSP2025BAUC200
5V = LSP2025BAUC250
AG = LSP2025BAUC280
AH = LSP2025BAUC285
5W = LSP2025BAUC300
5G = LSP2025BAUC310
AU = LSP2025BAUC330
5X = LSP2025BAUC390

2) WS = Date Code
W = Week
S = Internal Code

Marking Information (Contd.)

(5) X2DFN1010-4L

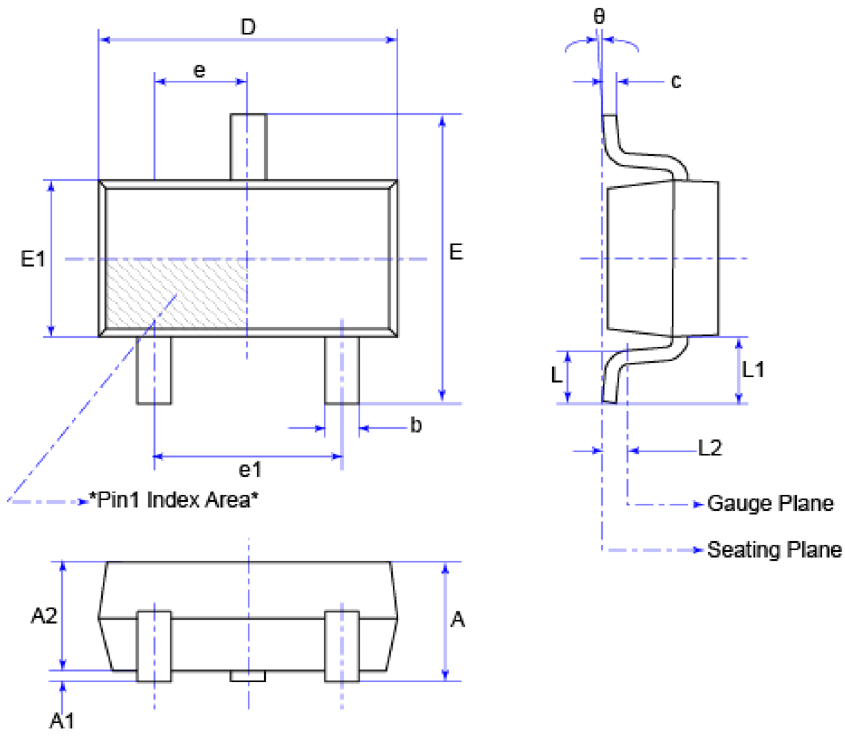


1) □ = Marking Name
   1 = LSP2025ADBC080
   8 = LSP2025ADBC100
   2 = LSP2025ADBC120
   3 = LSP2025ADBC150
   4 = LSP2025ADBC180
   B = LSP2025ADBC200
   K = LSP2025ADBC220
   6 = LSP2025ADBC250
   7 = LSP2025ADBC280
   9 = LSP2025ADBC285
   A = LSP2025ADBC300
   D = LSP2025ADBC310
   5 = LSP2025ADBC330
   C = LSP2025ADBC390

2) WS = Date Code
   W = Week
   S = Internal Code

Mechanical Information

(1) SOT23-3L

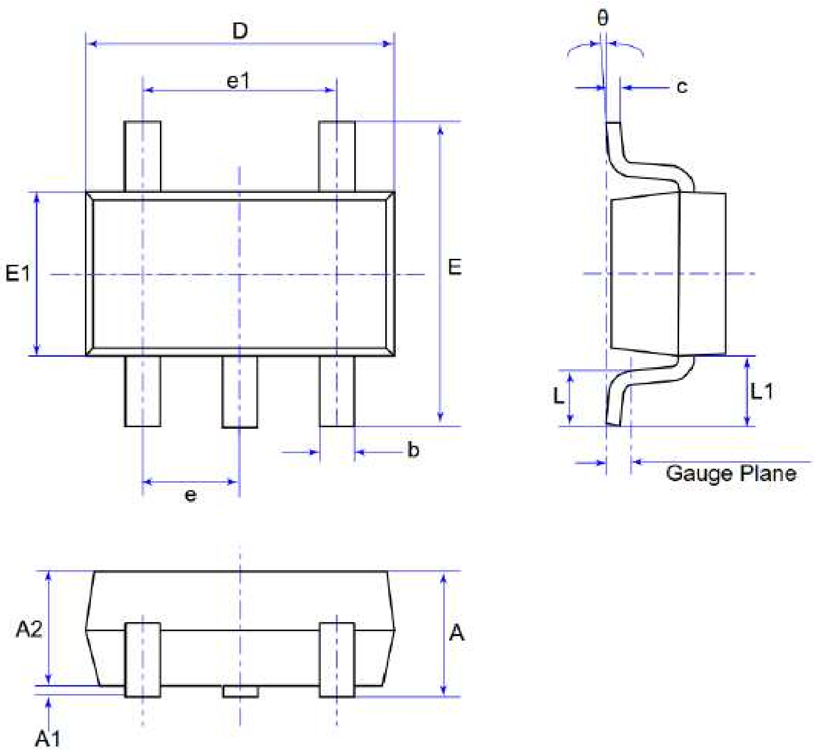


Unit: mm

Symbol	Min	Max
A	-	1.35
A1	0.00	0.15
A2	1.00	1.20
b	0.30	0.50
c	0.08	0.21
D	2.72	3.12
E	2.60	3.00
E1	1.40	1.80
e	0.95 BSC	
e1	1.90 REF	
L	0.30	0.60
L1	0.60 REF	
L2	0.25 BSC	
θ	0°	8°

Mechanical Information (Contd.)

(2) SOT23-5L

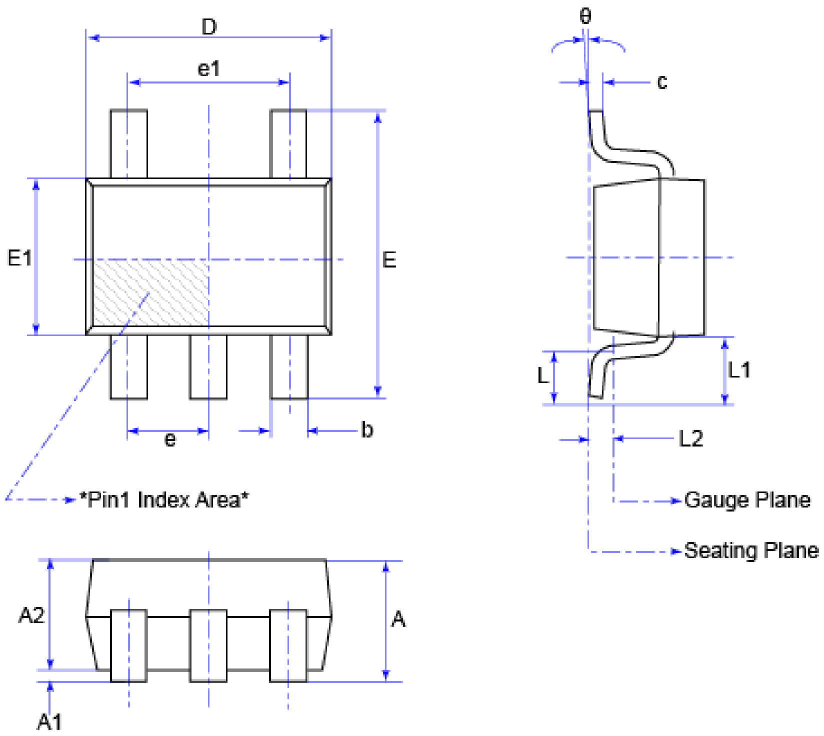


Unit: mm

Symbol	Min	Max
A	-	1.35
A1	-	0.15
A2	1.00	1.20
b	0.30	0.50
c	0.08	0.21
D	2.72	3.12
E	2.60	3.00
E1	1.40	1.80
e	0.95 BSC	
e1	1.80	2.00
L	0.30	0.60
L1	0.60 REF	
Gauge Plane	0.25 REF	
θ	0°	8°

Mechanical Information (Contd.)

(3) SC70-5L (SOT353)

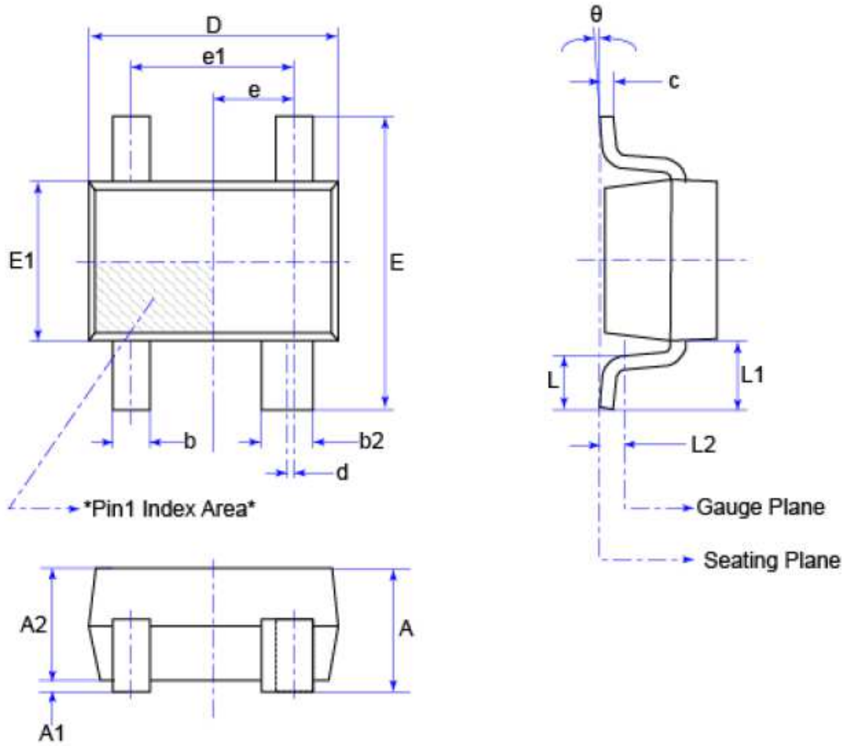


Unit: mm

Symbol	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.080	0.150
D	2.000	2.200
E	2.150	2.450
E1	1.150	1.350
e	0.650 TYP	
e1	1.200	1.400
L	0.260	0.460
L1	0.525 REF	
L2	0.200 BSC	
θ	0°	8°

Mechanical Information (Contd.)

(4) SC82 (SOT343R)

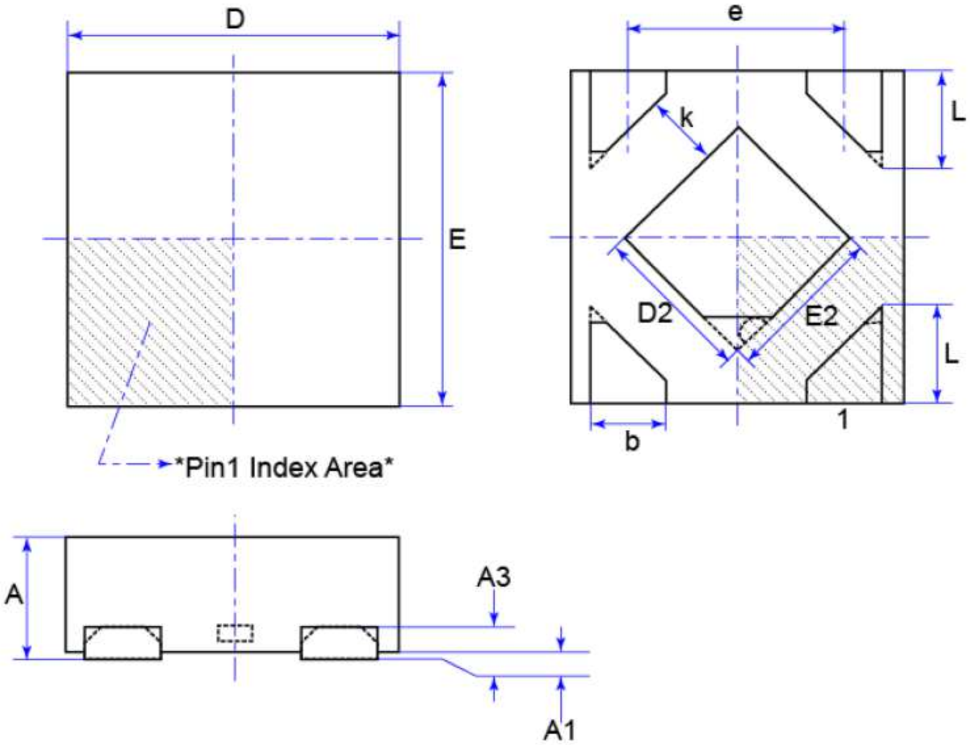


Unit: mm

Symbol	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.250	0.400
b2	0.350	0.500
c	0.080	0.150
D	2.000	2.200
E	2.150	2.450
E1	1.150	1.350
e	0.650 TYP	
e1	1.200	1.400
L	0.260	0.460
L1	0.525 REF	
L2	0.200 BSC	
θ	0°	8°

Mechanical Information (Contd.)

(5) X2DFN1010-4L



Unit: mm

Symbol	Min	Max
A	0.300	0.400
A1	-	0.050
A3	0.102 REF	
b	0.180	0.300
D	0.950	1.050
D2	0.430	0.530
E	0.950	1.050
E2	0.430	0.530
e	0.650 BSC	
k	0.213 REF	
L	0.174	0.370

MSL (Moisture Sensitive Level) Information

IPC/JEDEC J-STD-020D.1 Moisture Sensitivity Levels Table

LEVEL	FLOOR LIFE		SOAK REQUIREMENTS				
			Standard		Accelerated Equivalent [1]		
					eV 0.40-0.48	eV 0.30-0.39	CONDITION
	TIME	CONDITION	TIME (hours)	CONDITION	TIME (hours)	TIME (hours)	
1	Unlimited	≤30 °C /85% RH	168 +5/-0	85 °C /85% RH	NA	NA	NA
2	1 year	≤30 °C /60% RH	168 +5/-0	85 °C /60% RH	NA	NA	NA
2a	4 weeks	≤30 °C /60% RH	696[2] +5/-0	30 °C /60% RH	120 -1/+0	168 -1/+0	60 °C/ 60% RH
3	168 hours	≤30 °C /60% RH	192[2] +5/-0	30 °C /60% RH	40 -1/+0	52 -1/+0	60 °C/ 60% RH
4	72 hours	≤30 °C /60% RH	96[2] +2/-0	30 °C /60% RH	20 +0.5/-0	24 +0.5/-0	60 °C/ 60% RH
5	48 hours	≤30 °C /60% RH	72[2] +2/-0	30 °C /60% RH	15 +0.5/-0	20 +0.5/-0	60 °C/ 60% RH
a	24 hours	≤30 °C /60% RH	48[2] +2/-0	30 °C /60% RH	10 +0.5/-0	13 +0.5/-0	60 °C/ 60% RH
6	Time on Label (TOL)	≤30 °C /60% RH	TOL	30 °C /60% RH	NA	NA	NA

Note 1: CAUTION - To use the ''accelerated equivalent" soak conditions, correlation of damage response (including electrical, after soak and reflow), should be established with the "standard" soak conditions. Alternatively, if the known activation energy for moisture diffusion of the package materials is in the range of 0.40 - 0.48 eV or 0.30 - 0.39 eV, the "accelerated equivalent" may be used. Accelerated soak times may vary due to material properties (e.g .mold compound, encapsulant, etc.). JEDEC document JESD22-A120 provides a method for determining the diffusion coefficient.

Note 2: The standard soak time includes a default value of 24 hours for semiconductor manufacturer's exposure time (MET) between bake and bag and includes the maximum time allowed out of the bag at the distributor's facility. If the actual MET is less than 24 hours the soak time may be reduced. For soak conditions of 30 °C/60% RH, the soak time is reduced by 1 hour for each hour the MET is less than 24 hours. For soak conditions of 60 °C/60% RH, the soak time is reduced by 1 hour for each 5 hours the MET is less than 24 hours. If the actual MET is greater than 24 hours the soak time must be increased. If soak conditions are 30 °C/60% RH, the soak time is increased 1 hour for each hour that the actual MET exceeds 24 hours. If soak conditions are 60 °C/60% RH, the soak time is increased 1 hour for each 5 hours that the actual MET exceeds 24 hours.