

GENERAL DESCRIPTION

ASPL1110 is a low dropout, positive linear regulator with very low quiescent current. It can supply 300mA output current with a input range from 1.7V to 7V, which makes it suitable for all kinds of applications.

ASPL1110 uses advanced CMOS technology to achieve very low dropout voltage (300mV @300mA). Fast structural design achieves 75dB PSRR at 1kHz while still maintaining a small 50uA quiescent current.

Trimming technique is used to guarantee output voltage accuracy within $\pm 2\%$.

ASPL1110 provides full fault protection including current limit, short circuit protection and thermal shut down.

Only 1uF ceramic capacitor is required to maintain stability and fast response.

2000V HBM ESD is guaranteed by design.

ASPL1110 is available in TSOT23-3L,SOT23-5L,TDFN1*1-4L packages which are lead free.

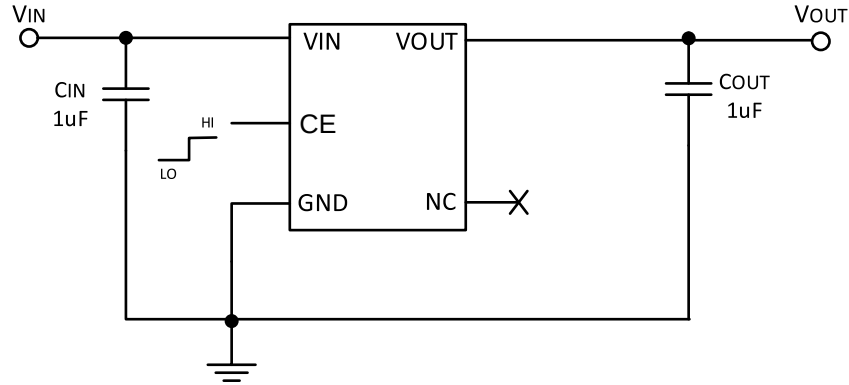
FEATURES

- 1.7V to 7V wide input range
- 300mA maximum output current
- Very low dropout voltage: 300mV@300mA($V_{out}=3.3V$)
- 75dB PSRR @ 1kHz
- 50uA low quiescent current
- $\pm 2\%$ output accuracy
- Support Fixed Output Voltage
0.7V,1.0V,1.2V,1.5V,1.8V,2.1V,2.5V,2.8V,3.0V,3.3V,3.6V.
- 0.02%/V Line regulation
- Auto discharge function
- -40°C~125°C wide operating temperature
- Foldback short circuit protection.
- 150°C thermal protection
- 2000V HBM ESD

APPLICATIONS

- Battery powered portable devices
- Smart phone, tablet
- Hi resolution camera sensor power
- Wireless modules
- RF,PLL,VCO clock power

TYPICAL APPLICATION



Note:

1) Input capacitor ($C_{IN}=1\mu F$) and Output capacitor ($C_{OUT}=1\mu F$) are recommended in all application circuit.

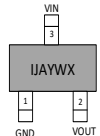
PING ASSIGNMENT

PIN Name	PIN #			PIN Function
	TSOT23-3L	SOT23-5L	TDFN1*1-4L	
VIN	3	1	4	Power Input
GND	1	2	2	Ground
CE		3	3	Chip Enable(Active-high)
NC		4		No Internal Connection
VOUT	2	5	1	Output of the Regulator

MARKING INFORMATION

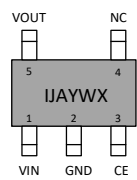
Package:TSOT23-3L

IJ:Product ID
A:Output Voltage
Y:Number of years
W:Nubber of weeks
X:Internal ID



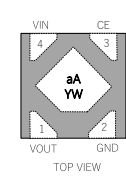
Package:SOT23-5L

IJ:Product ID
A:Output Voltage
Y:Number of years
W:Nubber of weeks
X:Internal ID



Package:TDFN1*1-4L

a:Product ID
A:Output Voltage
Y:Number of years
W:Number of weeks



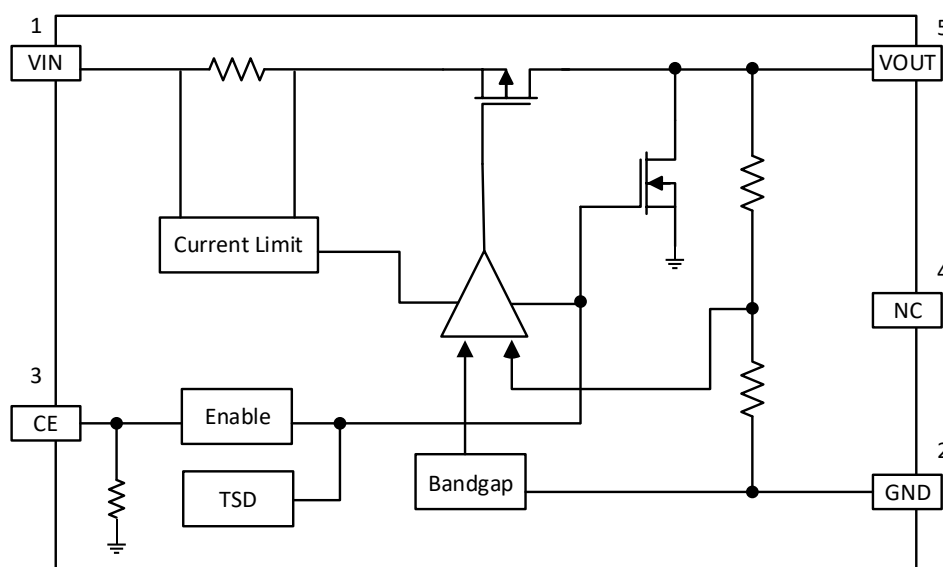
Note:

- 1.A:Output Voltage
- 2.Y:Number of years: 9=2019,B=2020,C=2021,D=2022...)
- 3.W:Number of weeks: 01-26: A-Z; 27-52:a-z

ORDER INFORMATION

Part Number	Package	Voltage option	Marking	Shipping
ASPL1110-10ZA-R	TSOT23-3L	1.0V	IJAYWX	Tape and Reel,3k
ASPL1110-12ZA-R	TSOT23-3L	1.2V	IJCYWX	Tape and Reel,3k
ASPL1110-15ZA-R	TSOT23-3L	1.5V	IJFYWX	Tape and Reel,3k
ASPL1110-18ZA-R	TSOT23-3L	1.8V	IJIYWX	Tape and Reel,3k
ASPL1110-25ZA-R	TSOT23-3L	2.5V	IJPYWX	Tape and Reel,3k
ASPL1110-28ZA-R	TSOT23-3L	2.8V	IJSYWX	Tape and Reel,3k
ASPL1110-30ZA-R	TSOT23-3L	3.0V	IJVVWX	Tape and Reel,3k
ASPL1110-33ZA-R	TSOT23-3L	3.3V	IJYYWX	Tape and Reel,3k
ASPL1110-36ZA-R	TSOT23-3L	3.6V	IJbYWX	Tape and Reel,3k
ASPL1110-07ZD-R	SOT23-5L	0.7V	IJ7YWX	Tape and Reel,3k
ASPL1110-10ZD-R	SOT23-5L	1.0V	IJAYWX	Tape and Reel,3k
ASPL1110-12ZD-R	SOT23-5L	1.2V	IJCYWX	Tape and Reel,3k
ASPL1110-15ZD-R	SOT23-5L	1.5V	IJFYWX	Tape and Reel,3k
ASPL1110-18ZD-R	SOT23-5L	1.8V	IJIYWX	Tape and Reel,3k
ASPL1110-21ZD-R	SOT23-5L	2.1V	IJLYWX	Tape and Reel,3k
ASPL1110-25ZD-R	SOT23-5L	2.5V	IJPYWX	Tape and Reel,3k
ASPL1110-28ZD-R	SOT23-5L	2.8V	IJSYWX	Tape and Reel,3k
ASPL1110-30ZD-R	SOT23-5L	3.0V	IJVVWX	Tape and Reel,3k
ASPL1110-33ZD-R	SOT23-5L	3.3V	IJYYWX	Tape and Reel,3k
ASPL1110-36ZD-R	SOT23-5L	3.6V	IJbYWX	Tape and Reel,3k
ASPL1110-10TG-R	TDFN1*1-4L	1.0V	aA YW	Tape and Reel,5k
ASPL1110-12TG-R	TDFN1*1-4L	1.2V	aC YW	Tape and Reel,5k
ASPL1110-15TG-R	TDFN1*1-4L	1.5V	aF YW	Tape and Reel,5k
ASPL1110-18TG-R	TDFN1*1-4L	1.8V	aI YW	Tape and Reel,5k
ASPL1110-25TG-R	TDFN1*1-4L	2.5V	aP YW	Tape and Reel,5k
ASPL1110-28TG-R	TDFN1*1-4L	2.8V	aS YW	Tape and Reel,5k
ASPL1110-30TG-R	TDFN1*1-4L	3.0V	aV YW	Tape and Reel,5k
ASPL1110-33TG-R	TDFN1*1-4L	3.3V	aY YW	Tape and Reel,5k
ASPL1110-36TG-R	TDFN1*1-4L	3.6V	ab YW	Tape and Reel,5k

BLOCK DIAGRAM



ASPL1110 Block diagram - SOT23-5L

ABSOLUTE MAXIMUM RATINGS

Parameter		Value
Max Input Voltage		10V
Max Operating Junction Temperature(Tj)		150°C
Ambient Temperature(Ta)		-40°C-125°C
Package Thermal Resistance	TSOT23-3L	280°C/W
	SOT23-5L	220°C/W
	TDFN1*1-4L	250°C/W
Storage Temperature(Ts)		-40°C-150°C
Lead Temperature & Time		260°C,10S

Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect

ELECTRICAL CHARACTERISTICS

(Test Conditions: $C_{in}=1\mu F$, $C_{out}=1\mu F$, $T_a=25^{\circ}C$, unless otherwise noted)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage range		1.7		7	V
Output Voltage range	$V_{IN}=\text{Set } V_{OUT}+1V$ $1mA<I_{OUT}<30mA$	V_{OUT} $\times 0.98$	V_{OUT}	V_{OUT} $\times 1.02$	V
Ground supply current	No load		50	75	μA
Max output current	$V_{in}-V_{out}=1V$	300			mA
Line regulation	$I_{load}=1mA$		0.02	0.1	%/V
Load regulation	$I_{load}=0-300mA$		15	30	mV
Dropout voltage	$I_{load}=300mA, V_{out}=3.3V$		300	500	mV
Current Limit		0.7	1	1.5	A
Short current			250		mA
TC	Output temperature coefficient	-100		100	ppm
PSRR	$V_{in}=V_{out}+0.5V, I_{load}=10mA$ $F=1kHz$		75		dB
Startup time			80		μs
CE high threshold				1	V
CE low threshold		0.4			V
Shutdown current	CE=0			1	μA
OTP		130	150	170	$^{\circ}C$
OTP hysteresis			40		$^{\circ}C$

Note1: All test are conducted under ambient temperature $25^{\circ}C$ and within a short period of time 20ms

FUNCTION DESCRIPTIONS

A minimum of $1\mu F$ capacitor must be connected from V_{out} to ground to insure stability. Input capacitor of $1\mu F$ is recommended to ensure the input voltage does not sag below the minimum dropout voltage during load transient event. V_{in} pin must always be dropout voltage higher than V_{out} in order for the device to regulate properly.

APPLICATION INFORMATION

Like and low-dropout regulators, ASPL1110 requires input and output decoupling capacitors. The device is specifically designed for portable applications requiring minimum board space and smallest components. These capacitors must be correctly selected for good performance. Please note that linear regulators with a low dropout voltage have high internal loop gains, which require care in guarding against oscillation caused by insufficient decoupling capacitors.

Capacitor Selection

Normally, use a 1 μ F capacitor on the input and a 1 μ F capacitor on the output of the ASPL1110. Larger input capacitor values and lower ESR (X5R, X7R) provide better supply noise rejection and transient response. A higher value output capacitor (2.2 μ F) may be necessary if large, fast transients are anticipated and the device is located several inches from the power source.

Input-Output (Dropout) Voltage

A regulator's minimum input-to-output voltage differential (dropout voltage) determines the lowest usable supply voltage. In battery-powered systems, this determines the useful end-of-life battery voltage. Because the device uses a PMOS, its dropout voltage is a function of drain to source on resistance, $R_{DS(on)}$, multiplied by the load current:

$$V_{dropout} = V_{in} - V_{out} = R_{DS(on)} \times I_{out}$$

Current Limit and Thermal Shutdown Protection

In order to prevent overloading or thermal condition from damaging the device, ASPL1110 has internal thermal and current limiting functions designed to protect the device. It will rapidly shut off PMOS pass element during overloading or over temperature condition.

Thermal Considerations

The ASPL1110 series can deliver a current of up to 600mA over the full operating junction temperature range. However, the maximum output current must be controlled at higher ambient temperature to ensure the junction temperature does not exceed 150°C. With all possible conditions, the junction temperature must be within the range specified under operating conditions. Power dissipation can be calculated based on the output current and the voltage drop across regulator.

$$P_d = (V_{in} - V_{out}) \times I_{out}$$

The final operating junction temperature for any set of conditions can be estimated by the following thermal equation:

$$P_d(\max) = (T_j(\max) - T_a) / \theta_{ja}$$

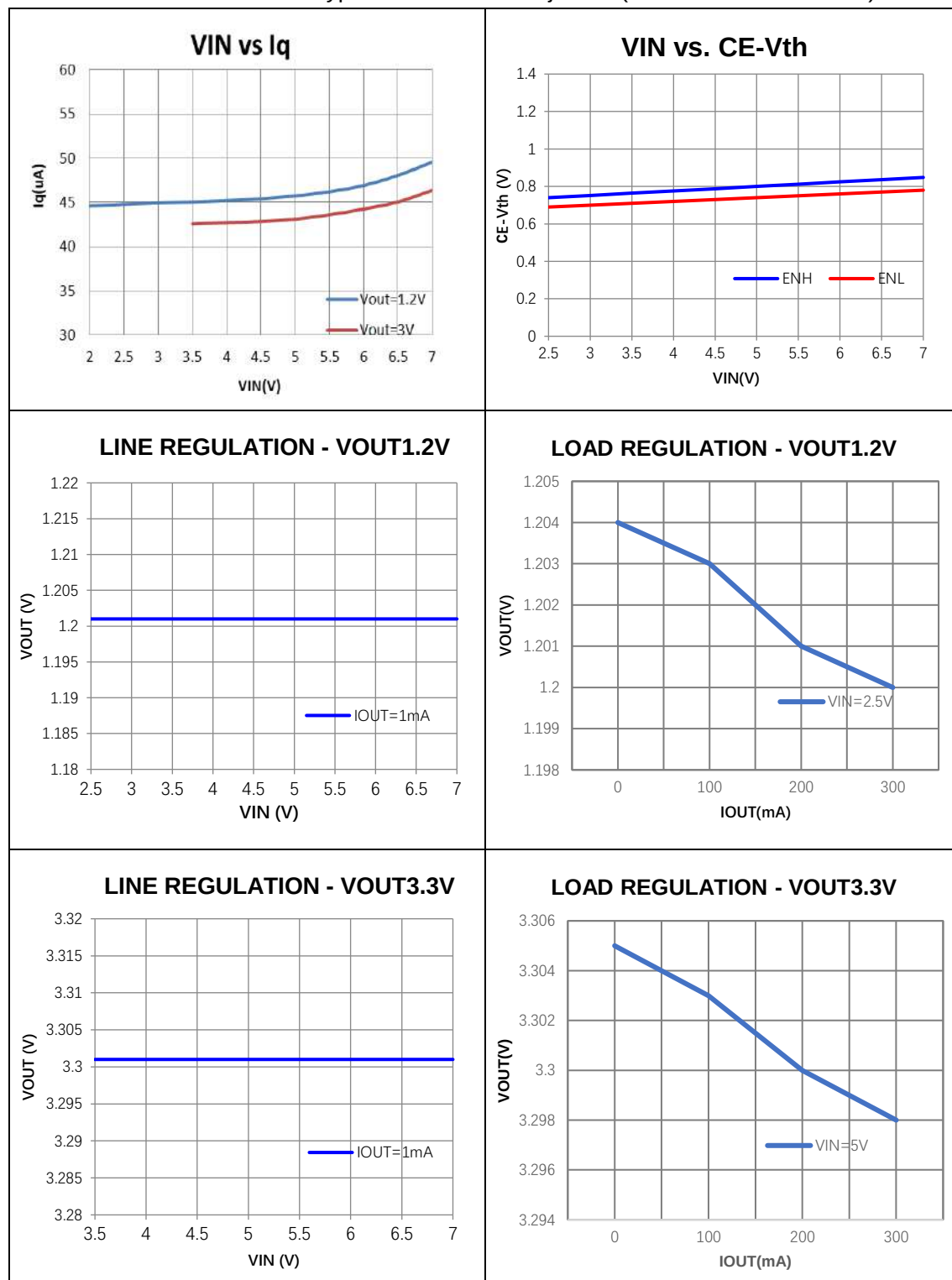
Where $T_j(\max)$ is the maximum junction temperature of the die (150°C) and T_a is the maximum ambient temperature.

PCB Layout

An input capacitance of $\approx 1\mu$ F is required between the ASPL1110 input pin and ground (the amount of the capacitance may be increased without limit), this capacitor must be located a distance of not more than 1cm from the input and return to a clean analog ground. Input capacitor can filter out the input voltage spikes caused by the surge current due to the inductive effect of the package pin and the printed circuit board's routing wire. Otherwise, the actual voltage at the V_{in} pin may exceed the absolute maximum rating. The output capacitor also must be located a distance of not more than 1cm from output to a clean analog ground. Because it can filter out the output spike caused by the surge current due to the inductive effect of the package pin and the printed circuit board's routing wire.

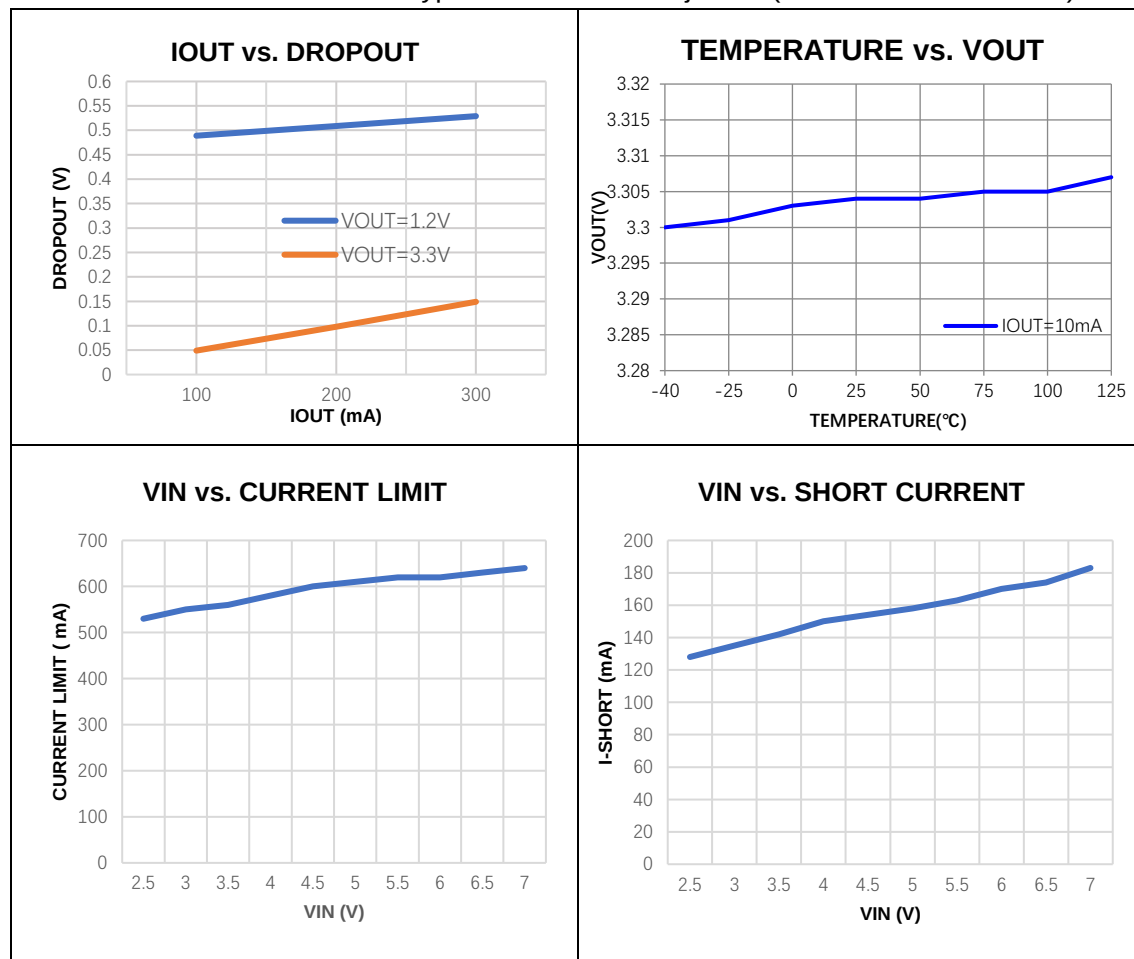
TYPICAL CHARACTERISTICS

CE=Vin, Cin=Cout=1uF, all typical values are at Tj=25°C(unless otherwise noted)



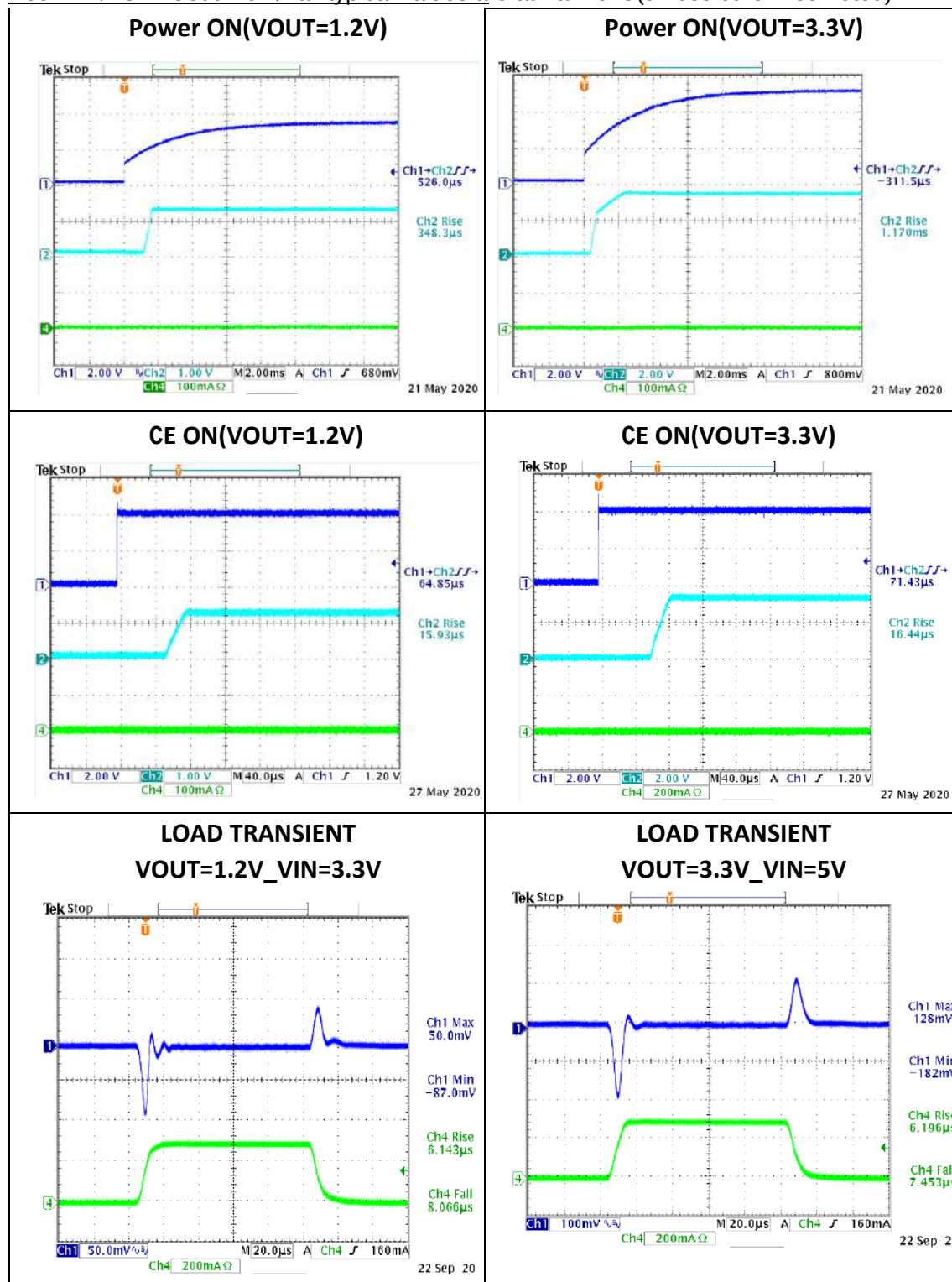
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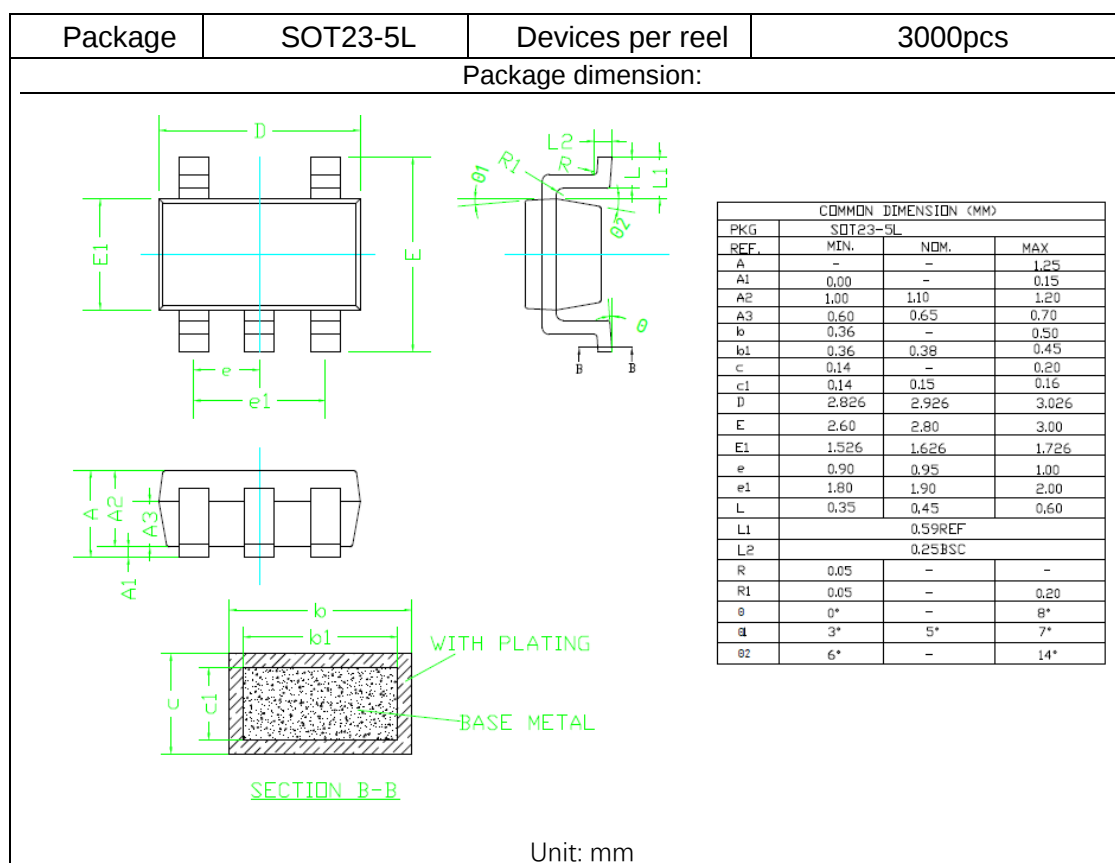
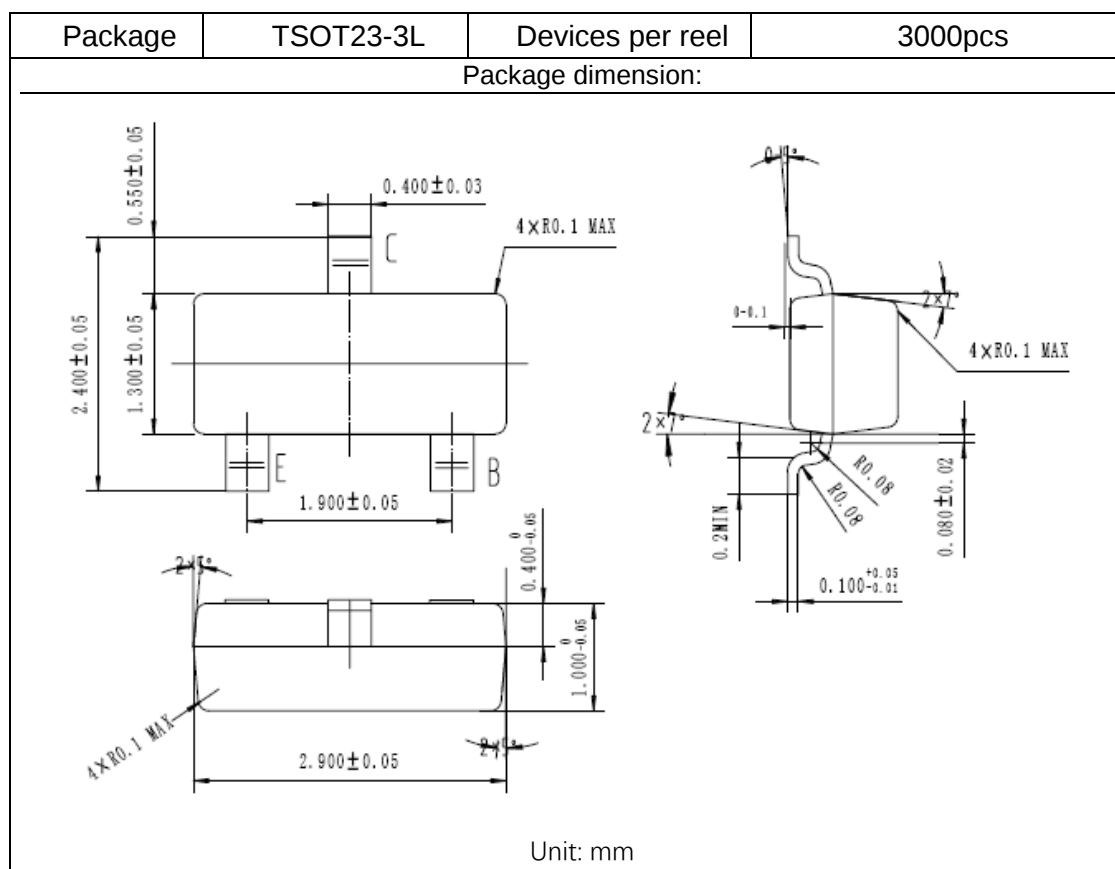


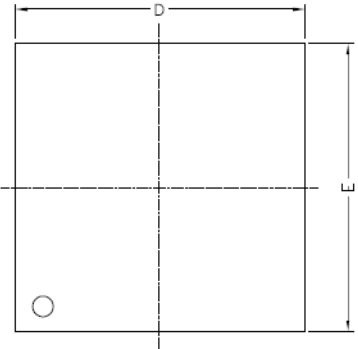
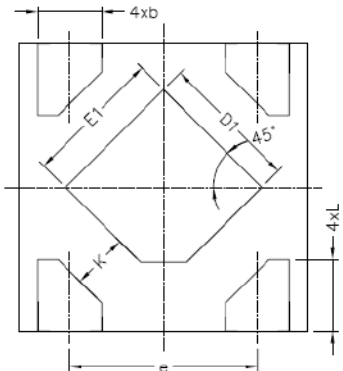
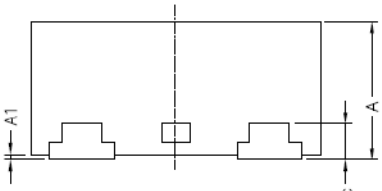
TYPICAL CHARACTERISTICS (continued)

$V_{ce}=V_{in}$, $C_{in}=C_{out}=1\mu F$, all typical values are at $T_a=25^{\circ}C$ (unless otherwise noted)



PACKAGE OUTLINE



Package	TDFN1*1-4L	Devices per reel	5000pcs																																																			
Package dimension:																																																						
 TOP VIEW  BOTTOM VIEW  SIDE VIEW <table border="1"> <thead> <tr> <th rowspan="2">SYMBOLS</th><th colspan="3">DIMENSIONS IN MM</th></tr> <tr> <th>Min</th><th>NOM</th><th>MAX</th></tr> </thead> <tbody> <tr> <td>A</td><td>0.43</td><td>0.48</td><td>0.53</td></tr> <tr> <td>A1</td><td></td><td></td><td>0.05</td></tr> <tr> <td>b</td><td>0.17</td><td>0.22</td><td>0.27</td></tr> <tr> <td>c</td><td></td><td>0.127</td><td></td></tr> <tr> <td>D</td><td>0.95</td><td>1.00</td><td>1.05</td></tr> <tr> <td>D1</td><td>0.43</td><td>0.48</td><td>0.53</td></tr> <tr> <td>E</td><td>0.95</td><td>1.00</td><td>1.05</td></tr> <tr> <td>E1</td><td>0.43</td><td>0.48</td><td>0.53</td></tr> <tr> <td>e</td><td colspan="3">0.65 BSC</td></tr> <tr> <td>K</td><td colspan="3">0.15</td></tr> <tr> <td>L</td><td>0.20</td><td>0.25</td><td>0.30</td></tr> </tbody> </table>				SYMBOLS	DIMENSIONS IN MM			Min	NOM	MAX	A	0.43	0.48	0.53	A1			0.05	b	0.17	0.22	0.27	c		0.127		D	0.95	1.00	1.05	D1	0.43	0.48	0.53	E	0.95	1.00	1.05	E1	0.43	0.48	0.53	e	0.65 BSC			K	0.15			L	0.20	0.25	0.30
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