

200mA Low-Dropout Linear Regulators

Features

- Low, 25 μ A No-Load Supply Current
- Guaranteed 200mA Output Current
- Dropout Voltage is 130mV @ 0.2A Load, V_{OUT} 3.3V
- Input voltage range: 2.4V~6V
- 1.21V ~ 5.0V output voltage
- Over-Temperature Protection and Short-Circuit Protection
- Max. Supply Current in Shutdown Mode < 1 μ A
- Stable with Low Cost Ceramic Capacitors
- Output Discharge for Fast Turn-Off

Applications

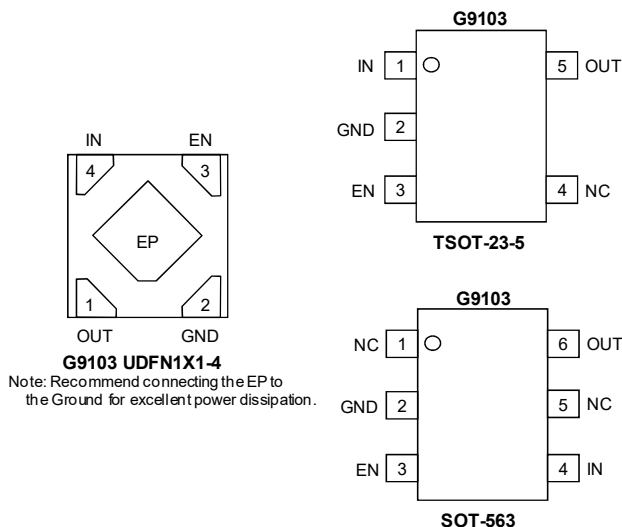
- Notebook Computers
- Cellular Phones
- PDAs
- Digital still Camera and Video Recorders
- Hand-Held Devices
- Bar Code Scanners

General Description

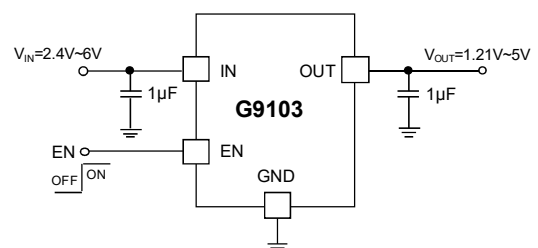
The G9103 is a low supply current, low dropout linear regulator that comes in a space saving UDFN1X1-4, package. An over-temperature protection circuit is built-in in the G9103 to prevent thermal overload. These power saving features make the G9103 ideal for use in the battery-powered applications such as notebook computers, cellular phones, and PDA's.

These devices feature a shutdown function and are offered in active low with auto discharge. The G9103 is specifically designed to employ ceramic output capacitors. The G9103 comes in a space saving UDFN1X1-4, TSOT-23-5 and SOT-563 package.

Pin Configuration



Typical Application Circuit



Ordering Information

ORDER NUMBER	MARKING	VOLTAGE	TEMP. RANGE	PACKAGE (Green)
G9103-120N61U	93 Sx	1.20V	-40°C~ +85°C	UDFN1X1-4
G9103-150N61U	93 Hx	1.50V	-40°C~ +85°C	UDFN1X1-4
G9103-180N61U	93 Ax	1.80V	-40°C~ +85°C	UDFN1X1-4
G9103-180N61G	93 Ax	1.80V	-40°C~ +85°C	UDFN1X1-4
G9103-275N61U	93 Fx	2.75V	-40°C~ +85°C	UDFN1X1-4
G9103-280N61U	93 Bx	2.80V	-40°C~ +85°C	UDFN1X1-4
G9103-285N61U	93 Gx	2.85V	-40°C~ +85°C	UDFN1X1-4
G9103-300N61U	93 Dx	3.00V	-40°C~ +85°C	UDFN1X1-4
G9103-315N61U	93 Ex	3.15V	-40°C~ +85°C	UDFN1X1-4
G9103-330N61U	93 Cx	3.30V	-40°C~ +85°C	UDFN1X1-4
G9103-330N61G	93 Cx	3.30V	-40°C~ +85°C	UDFN1X1-4
G9103-400N61U	93 Fx	4.00V	-40°C~ +85°C	UDFN1X1-4
G9103-500N61U	93 Gx	5.00V	-40°C~ +85°C	UDFN1X1-4
G9103-150TO1U	913Hx	1.50V	-40°C~ +85°C	TSOT-23-5
G9103-180TO1U	913Ax	1.80V	-40°C~ +85°C	TSOT-23-5
G9103-280TO1U	913Bx	2.80V	-40°C~ +85°C	TSOT-23-5
G9103-300TO1U	913Dx	3.00V	-40°C~ +85°C	TSOT-23-5
G9103-330TO1U	913Cx	3.30V	-40°C~ +85°C	TSOT-23-5
G9103-400TO1U	913Fx	4.00V	-40°C~ +85°C	TSOT-23-5
G9103-500TO1U	913Gx	5.00V	-40°C~ +85°C	TSOT-23-5
G9103-270TR1G	9Xx	2.70V	-40°C~ +85°C	SOT-563

Note: N6: UDFN1X1-4 TO: TSOT-23-5 TR: SOT-563

1: Bonding Code

U & G: Tape & Reel

Green : Lead Free / Halogen Free

Absolute Maximum Ratings

V_{IN} to GND	-0.3V to +6.5V
V_{OUT} to GND	-0.3V to ($V_{IN} + 0.3V$)
EN, PG to GND	-0.3V to ($V_{IN} + 0.3V$)
Output Short-Circuit Duration	Infinite
Thermal Resistance Junction to Ambient, (θ_{JA})	
UDFN1X1-4	150°C/W ⁽¹⁾
TSOT-23-5	250°C/W ⁽²⁾
SOT-563	130°C/W ⁽¹⁾
Continuous Power Dissipation ($T_A = +25^\circ\text{C}$)	
UDFN1X1-4	0.93W ⁽¹⁾

TSOT-23-5	0.48W ⁽²⁾
SOT-563	1.07W ⁽¹⁾
Thermal Resistance Junction to Case, (θ_{JC})	
UDFN1X1-4	31°C/W
TSOT-23-5	66°C/W
SOT-563	60°C/W
Operating Temperature Range	-40°C to +85°C
Junction Temperature	150°C
Storage Temperature Range	-55°C to +150°C
Reflow Temperature (soldering, 10sec)	260°C

Note:

⁽¹⁾: The package is placed on a 2-layer PCB (1oz) with via. Please refer to EV Board PCB Layout Section.

⁽²⁾: Please refer to Minimum Footprint PCB Layout Section.

Stresses beyond those listed under "Absolute Maximum Ratings" may 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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

($V_{IN} = V_{OUT} + 1V$, $V_{IN} = 2.5V$ for $V_{OUT} < 1.5V$, $I_{OUT} = 1mA$, $V_{EN} = V_{IN}$, $C_{OUT} = 1\mu F$, $T_A = T_J = +25^\circ\text{C}$.) ⁽¹⁾

The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified.

PARAMETER	SYMBOL	CONDITION		MIN	TYP	MAX	UNIT
Input Voltage (Note 2)	V _{IN}			2.4	---	6	V
V _{IN} Under-voltage Lockout	V _{IN_UVLO}	V _{IN} rising		1.2	1.7	2.4	V
Output Voltage Accuracy	V _{OUT}	25°C	V _{OUT} >2V	X0.99	---	x1.01	V
			V _{OUT} ≤2V	-20	---	+20	mV
		-40°C to +85°C	V _{OUT} >2V	X0.985	---	x1.015	V
			V _{OUT} ≤2V	-30	---	+30	mV
Line Regulation	V _{LNR}	Δ V _{OUT} / Δ V _{IN} , I _{OUT} =1mA V _{OUT} +0.5V<V _{IN} <5.0V V _{IN} =2.5V for V _{OUT} ≤ 2.0V		---	0.02	0.1	%/V
Load Regulation	V _{LDR}	I _{OUT} = 1mA to 150mA V _{IN} = V _{OUT} +1V, V _{IN} =3V for V _{OUT} ≤ 2.0V		---	10	30	mV
Dropout Voltage ⁽²⁾	V _{DO}	I _{OUT} =150mA	2.5V ≤ V _{OUT} < 2.8V	---	0.22	0.3	V
			2.8V ≤ V _{OUT} ≤ 3.3V	---	0.21	0.27	
Output Current Limit	I _{CL}	V _{OUT} =90%*V _{OUT(NOM)} V _{IN} = V _{OUT} +1V, V _{IN} =3V for V _{OUT} ≤ 2.0V		210	400	650	mA
Quiescent Current	I _Q	I _{OUT} =0mA		---	25	50	μA
Shutdown Current	I _{SDN}	V _{EN} ≤0.4V, V _{IN} =5.5V		---	0.12	1	μA
Power Supply Rejection Ratio	PSRR	f=1kHz, Ripple 0.2Vp-p, V _{OUT} = V _{IN} +1V, I _{OUT} =30mA V _{IN} =3V for V _{OUT} ≤ 2.0V		---	75	---	dB
Output Noise Voltage	V _N	I _{OUT} =30mA, f= 10Hz to 100kHz		---	60		μV _{RMS}
Enable Input Threshold	V _{EN_HI}			1	---	---	V
	V _{EN_LO}			---	---	0.4	
Enable Pin Input Current	I _{EN}	V _{EN} =5.5V		---	100	500	nA
Discharge Resistance	R _{DIS_LDO}			---	100	---	Ω
Thermal Shutdown Temperature	T _{SHDN}			---	160	---	°C
Thermal Shutdown Hysteresis	ΔT _{SHDN}			---	20	---	°C

Note 1: Limits is 100% production tested at $T_A = +25^\circ\text{C}$. Low duty pulse techniques are used during test to maintain junction temperature as close to ambient as possible.

Note 2: The dropout voltage is defined as ($V_{IN} - V_{OUT}$) when V_{OUT} drops 100mV below the regulated output voltage $V_{OUT(NOM)}$ at $V_{IN} = V_{OUT(NOM)} + 0.3V$.

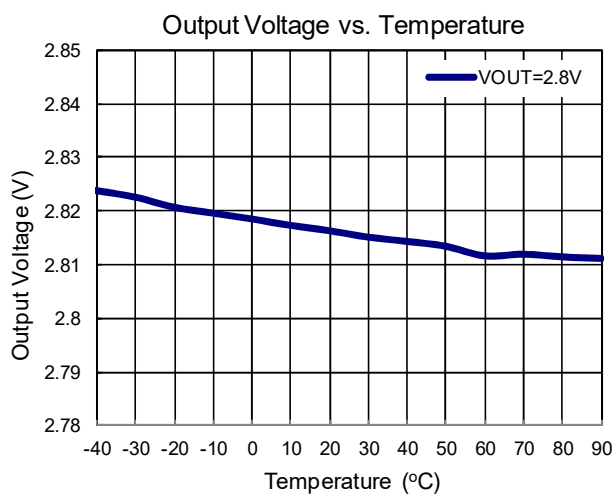
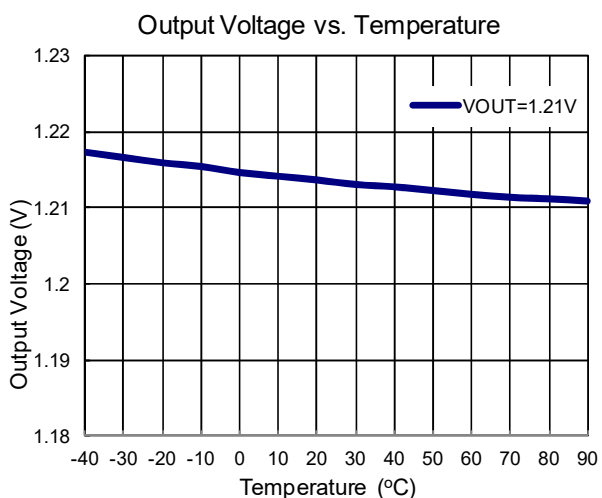
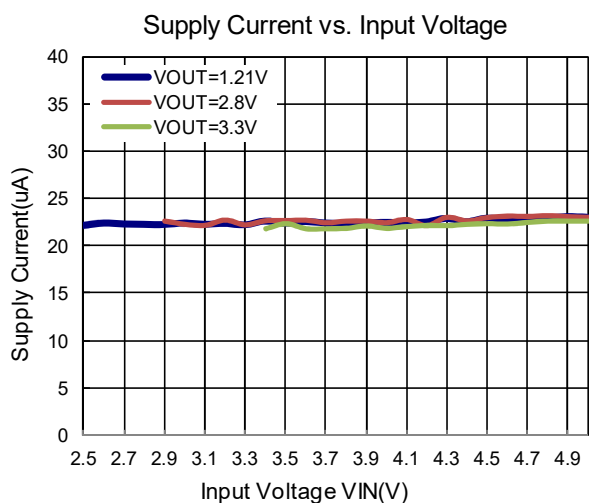
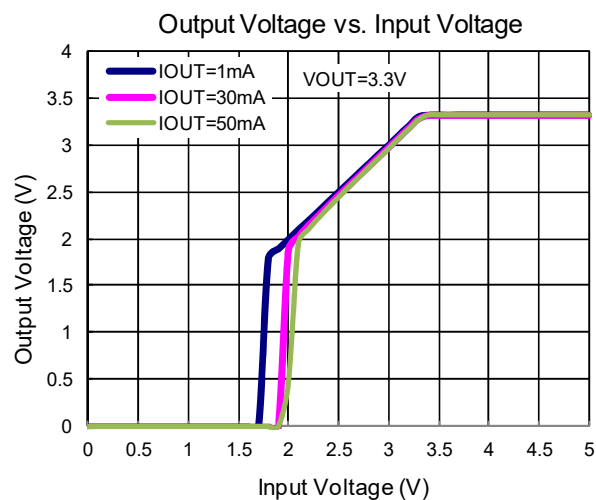
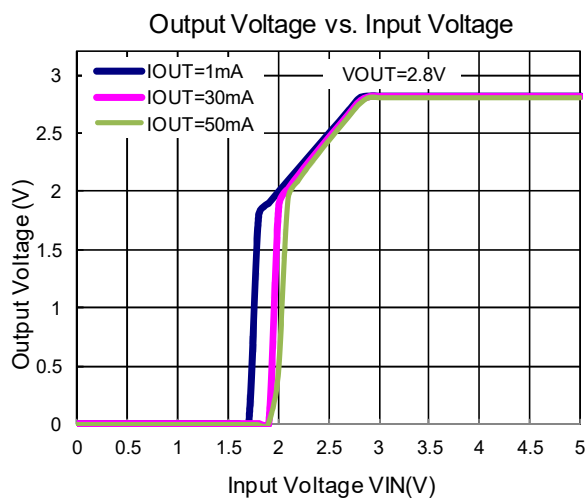
Ver: 0.95

Aug 17, 2022

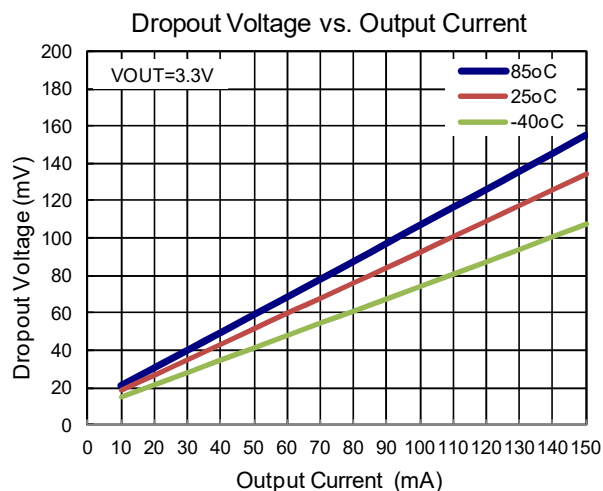
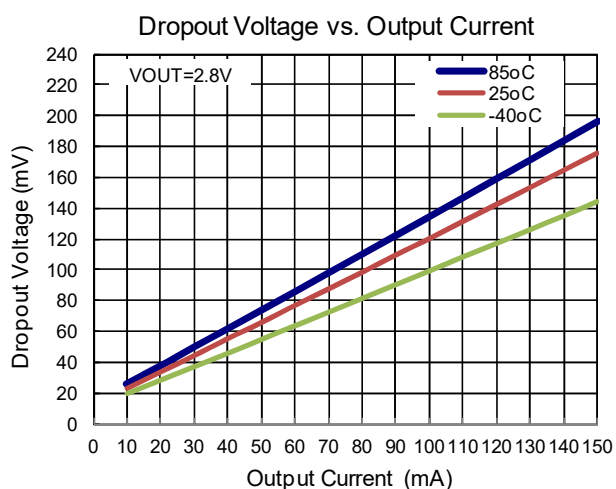
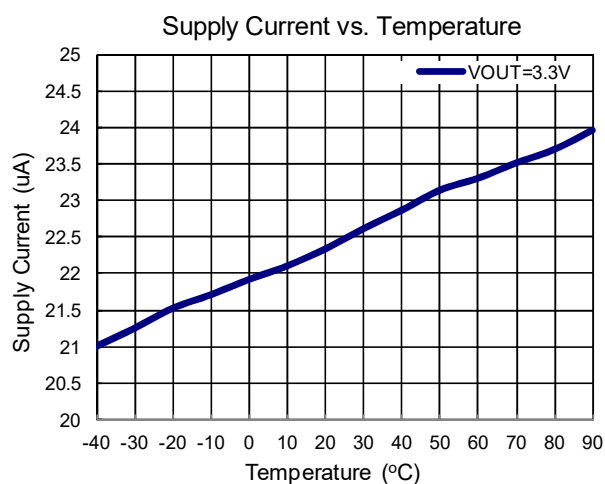
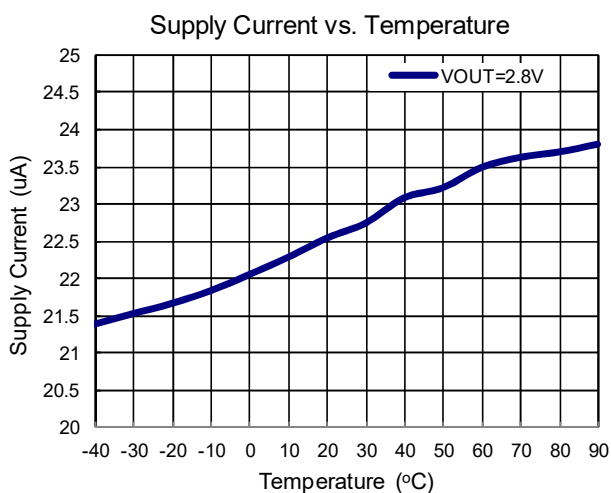
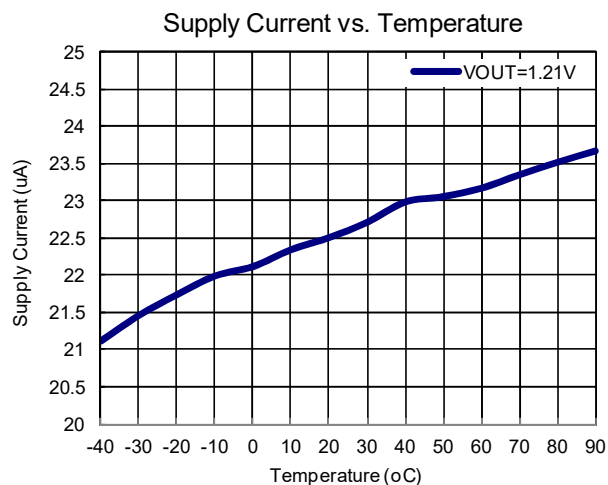
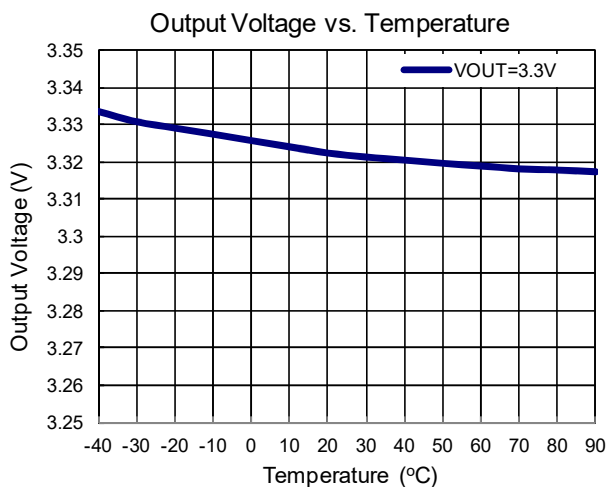
TEL: 886-3-5788833
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Typical Performance Characteristics

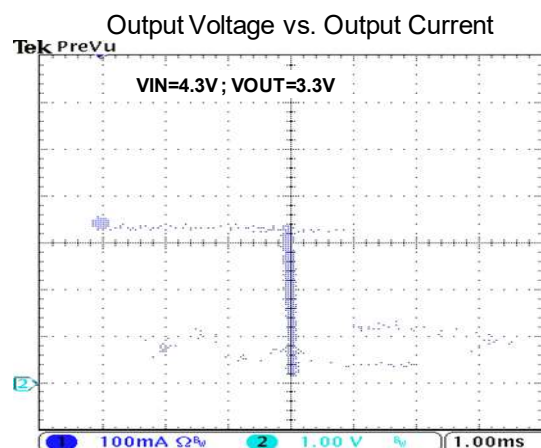
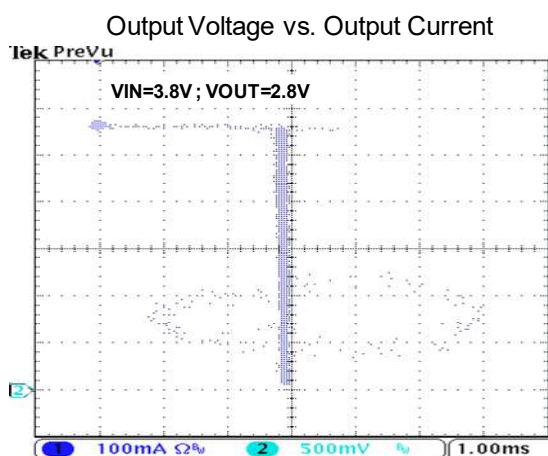
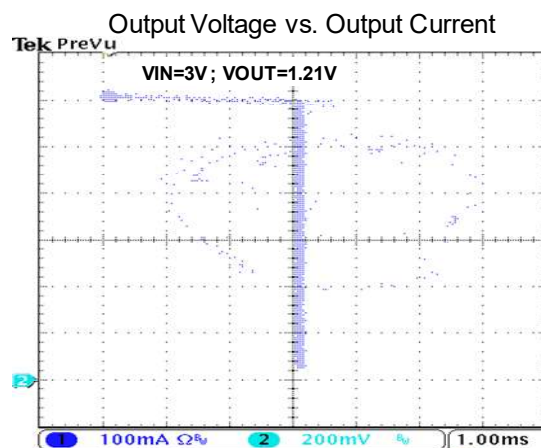
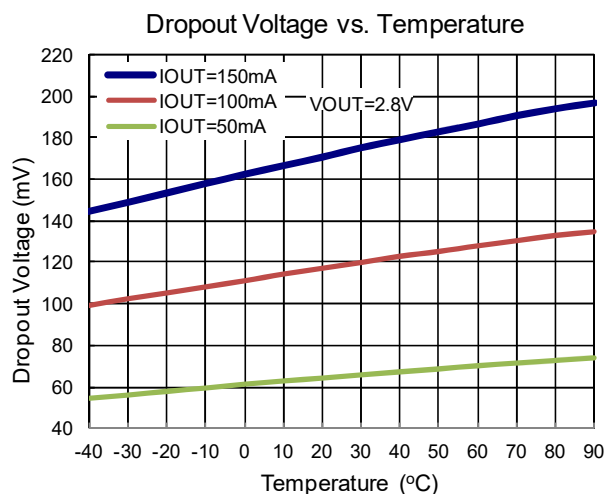
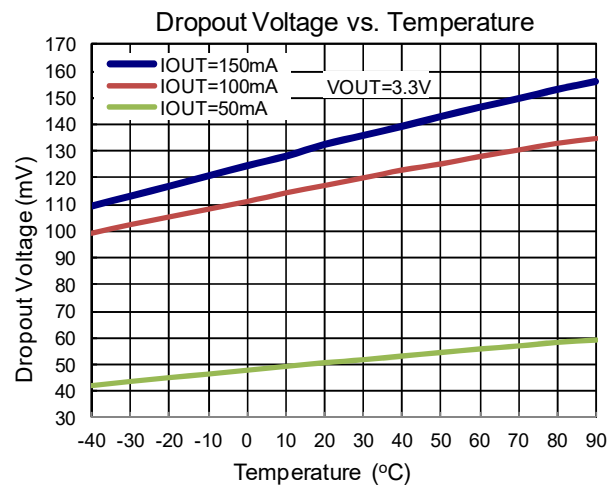
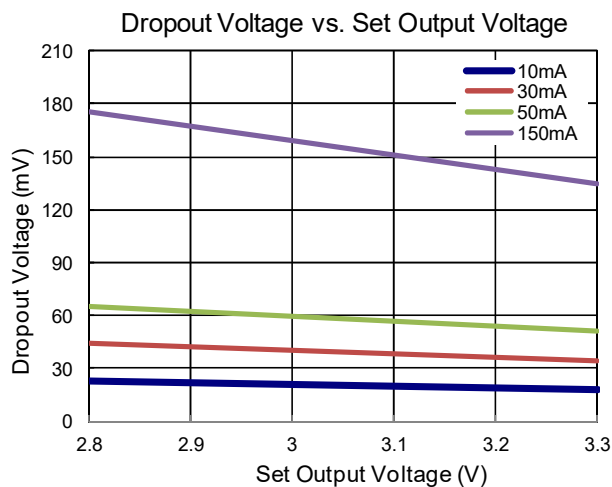
(T_A = 25°C)



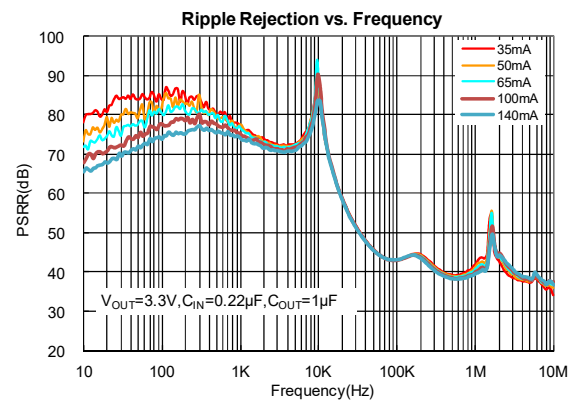
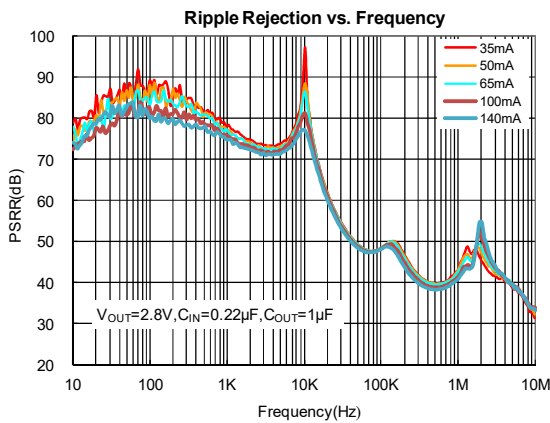
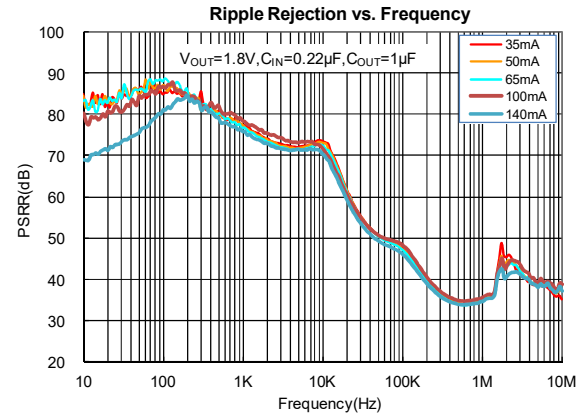
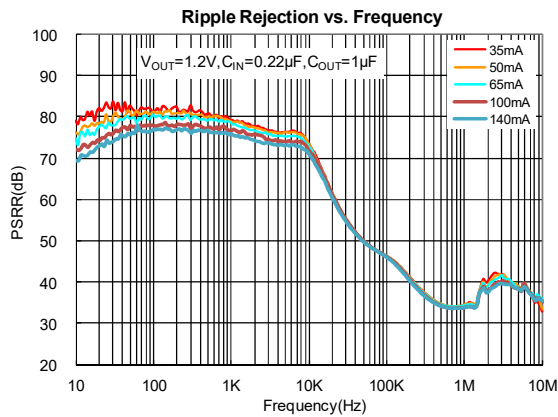
Typical Performance Characteristics (continued)



Typical Performance Characteristics (continued)

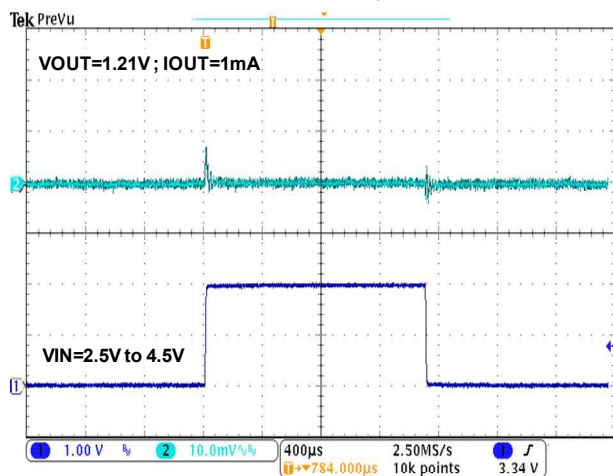


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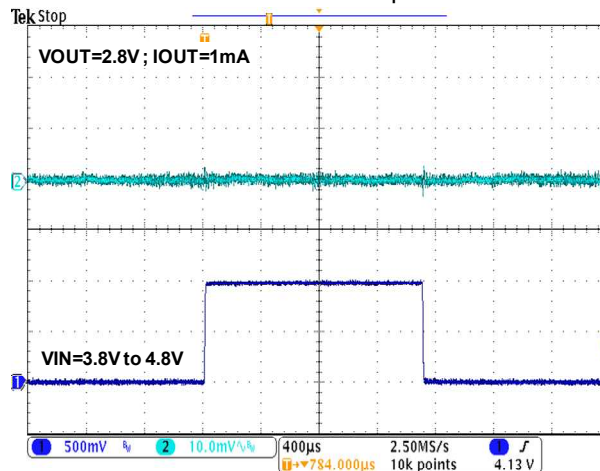


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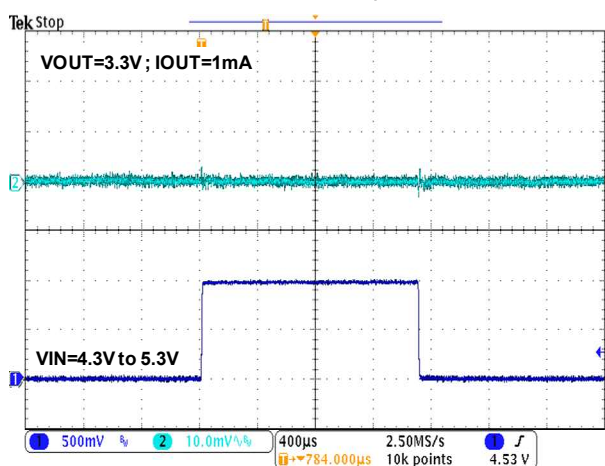
Line Transient Response



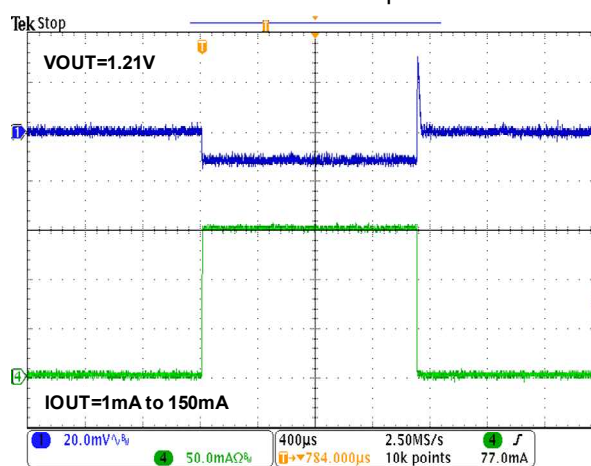
Line Transient Response



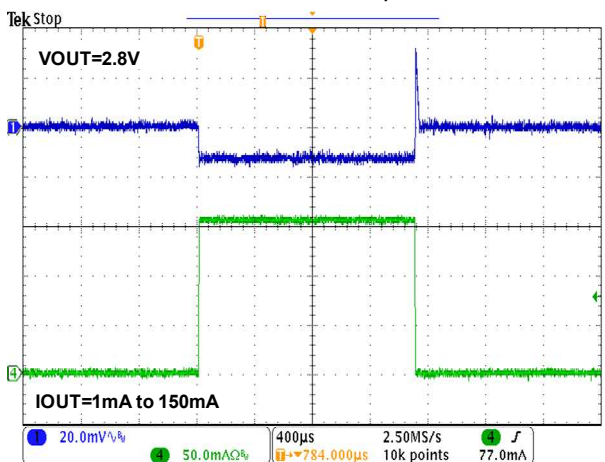
Line Transient Response



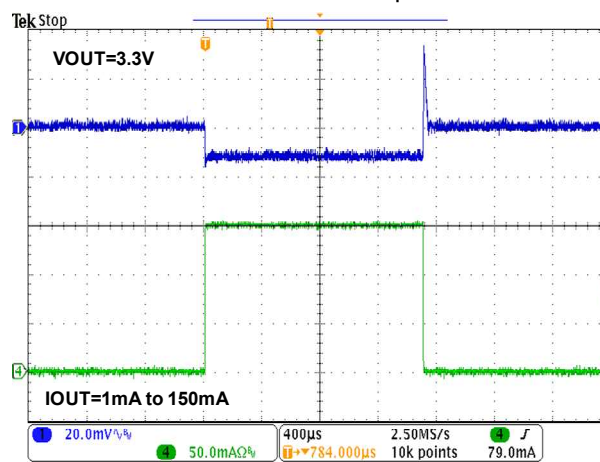
Load Transient Response



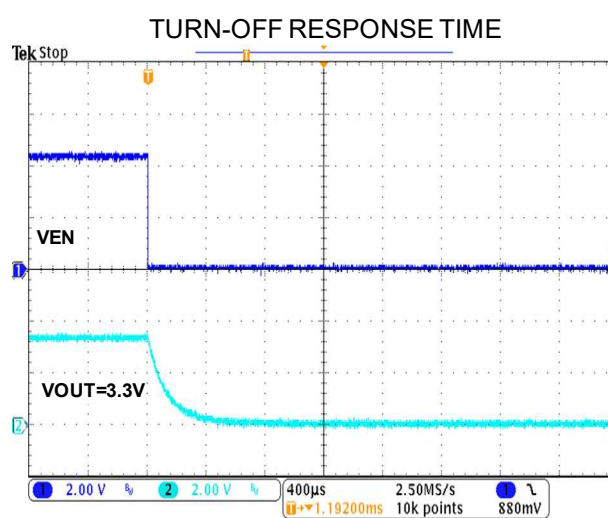
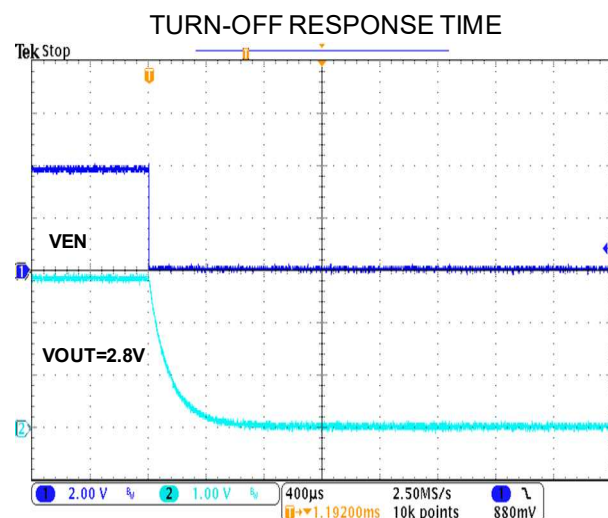
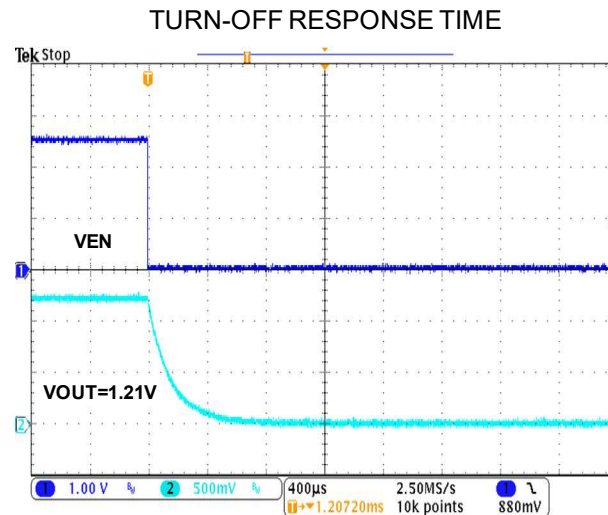
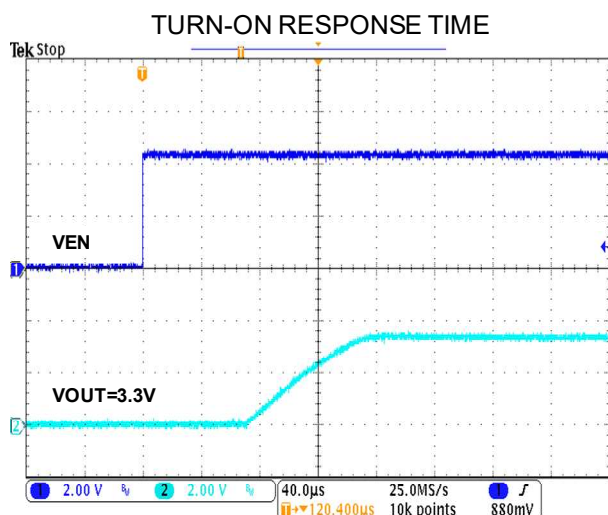
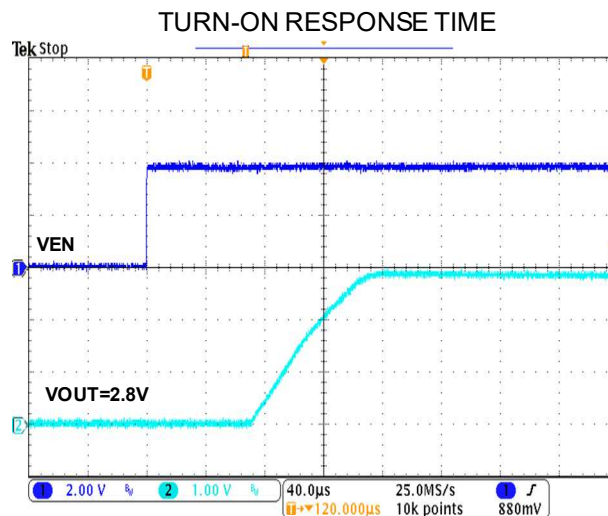
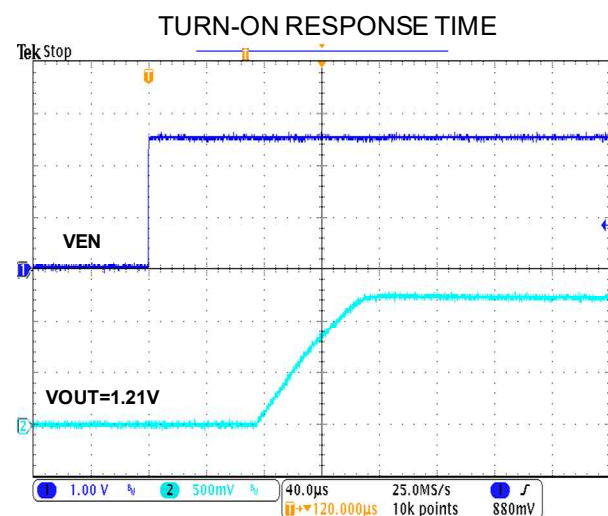
Load Transient Response



Load Transient Response



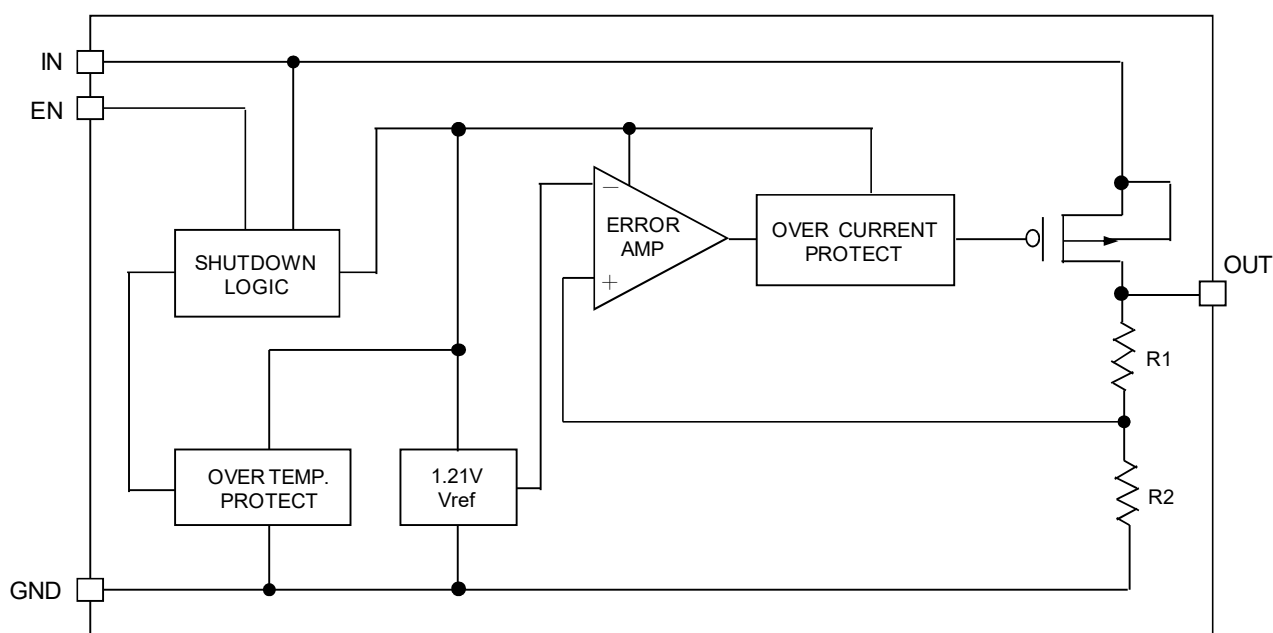
Typical Performance Characteristics (continued)



Pin Description

PIN			NAME	FUNCTION
UDFN1X1-4	TSOT-23-5	SOT-563		
1	5	6	OUT	The power output of the device.
2,EP	2	2	GND	Reference ground.
3	3	3	EN	Enable Input. Pulling this pin below 0.4V turns the regulator off, reducing the quiescent current to a fraction of its operating value.
4	1	4	IN	Input voltage. Large bulk capacitance should be placed closely to this pin. A 1 μ F ceramic capacitor is recommended at this pin.
-	4	1,5	NC	No Connection

Block Diagram



Definitions

Dropout Voltage

The input/output Voltage differential at which the regulator output no longer maintains regulation against further reductions in input voltage. Measured when the output drops 2% below its nominal value, dropout voltage is affected by junction temperature, load current and minimum input supply requirements.

Line Regulation

The change in output voltage for a change in input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that average chip temperature is not significantly affected.

Load Regulation

The change in output voltage for a change in load current at constant chip temperature. The measurement is made under conditions of low dissipation or by using pulse techniques such that average chip temperature is not significantly affected.

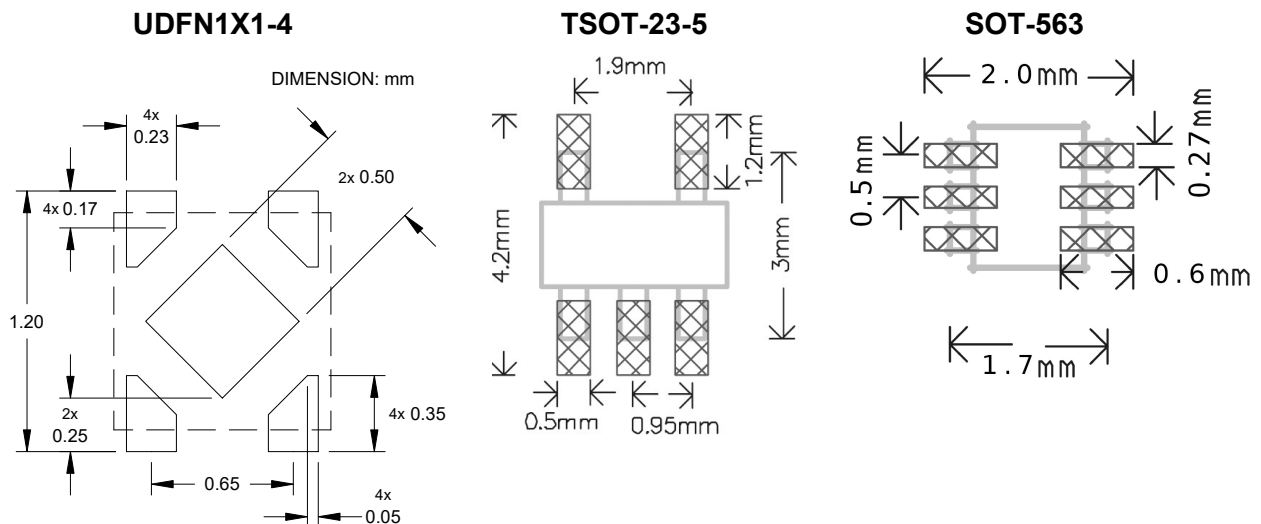
Maximum Power Dissipation

The maximum total device dissipation for which the regulator will operate within specifications.

Quiescent Bias Current

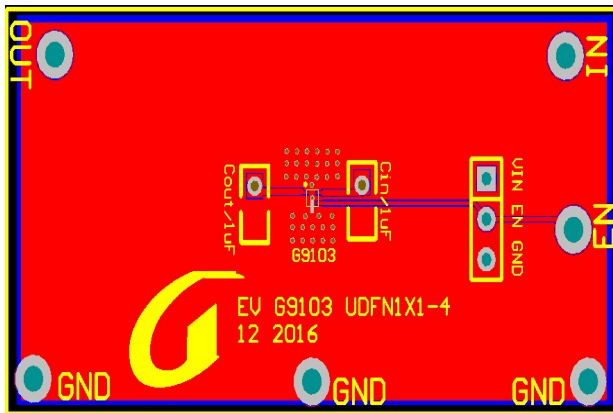
Current which is used to operate the regulator chip and is not delivered to the load.

Minimum Footprint PCB Layout Section

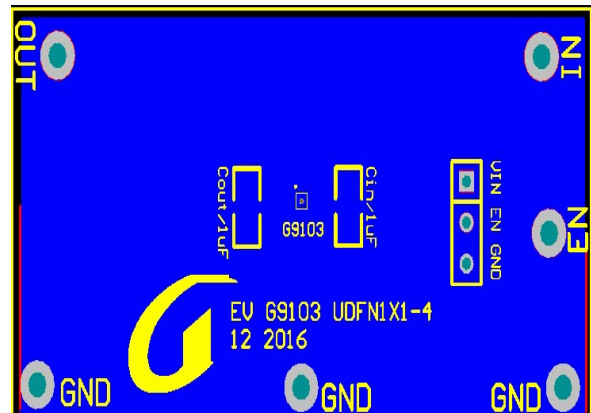


EV Board PCB Layout Section

Top Layer



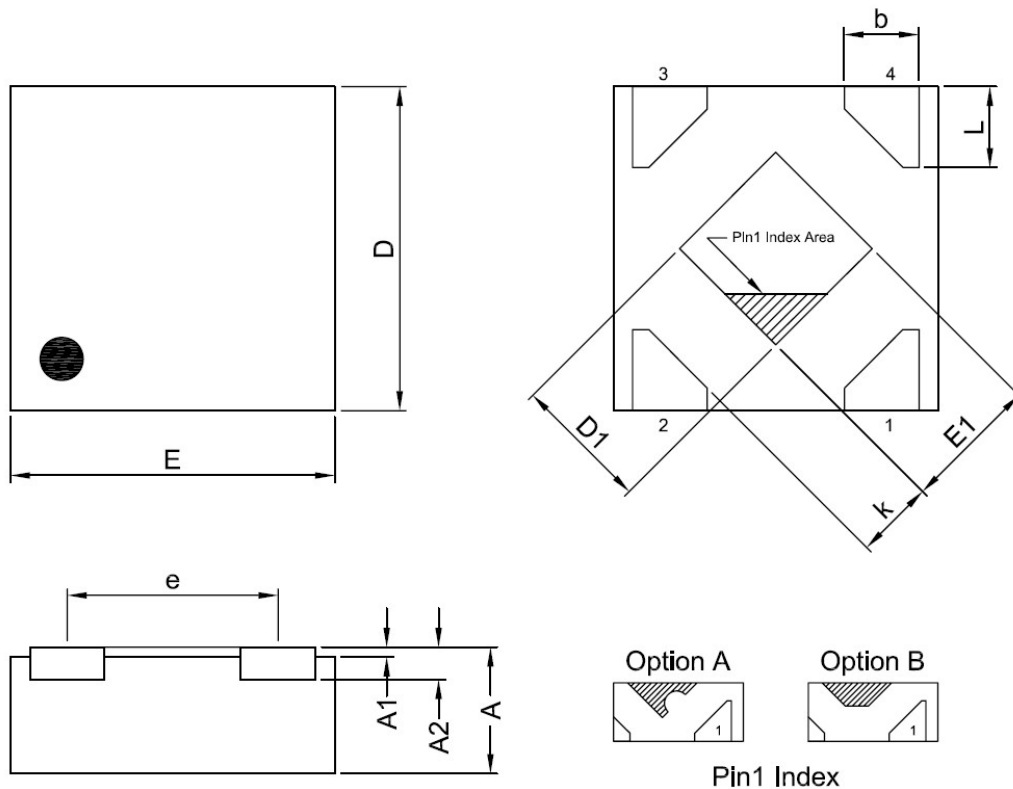
Bottom Layer



Board Information

Board Material	FR4
Size	50.7mmx25.3mm
Board Thickness	1.6mm
Layers	2
Copper Thickness	1 oz

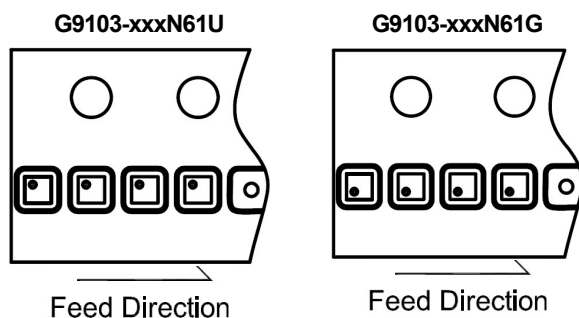
Package Information



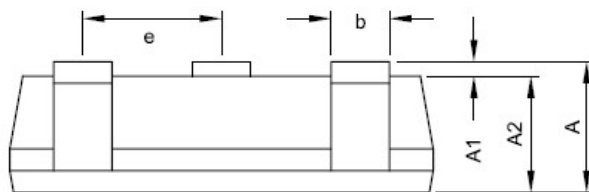
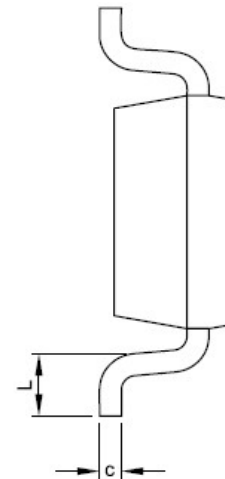
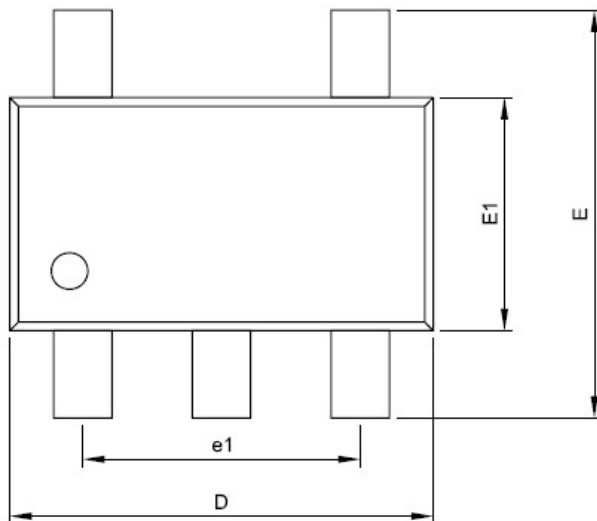
UDFN1X1-4 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.33	0.37	0.41	0.0130	0.0146	0.0161
A1	0.01	---	---	0.0004	---	---
A2	0.11 REF			0.0043 REF		
D	0.95	1.00	1.05	0.0374	0.0393	0.0413
E	0.95	1.00	1.05	0.0374	0.0393	0.0413
D1	0.42 REF			0.0165 REF		
E1	0.42 REF			0.0165 REF		
b	0.18	0.23	0.28	0.0071	0.0091	0.0110
e	0.65 BSC			0.0256 BSC		
L	0.22 REF			0.0087 REF		
k	0.17	---	---	0.0067	---	---

Taping Specification



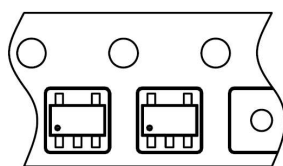
PACKAGE	Q'TY/REEL
UDFN1X1-4	5,000 ea



TSOT-23-5 Package

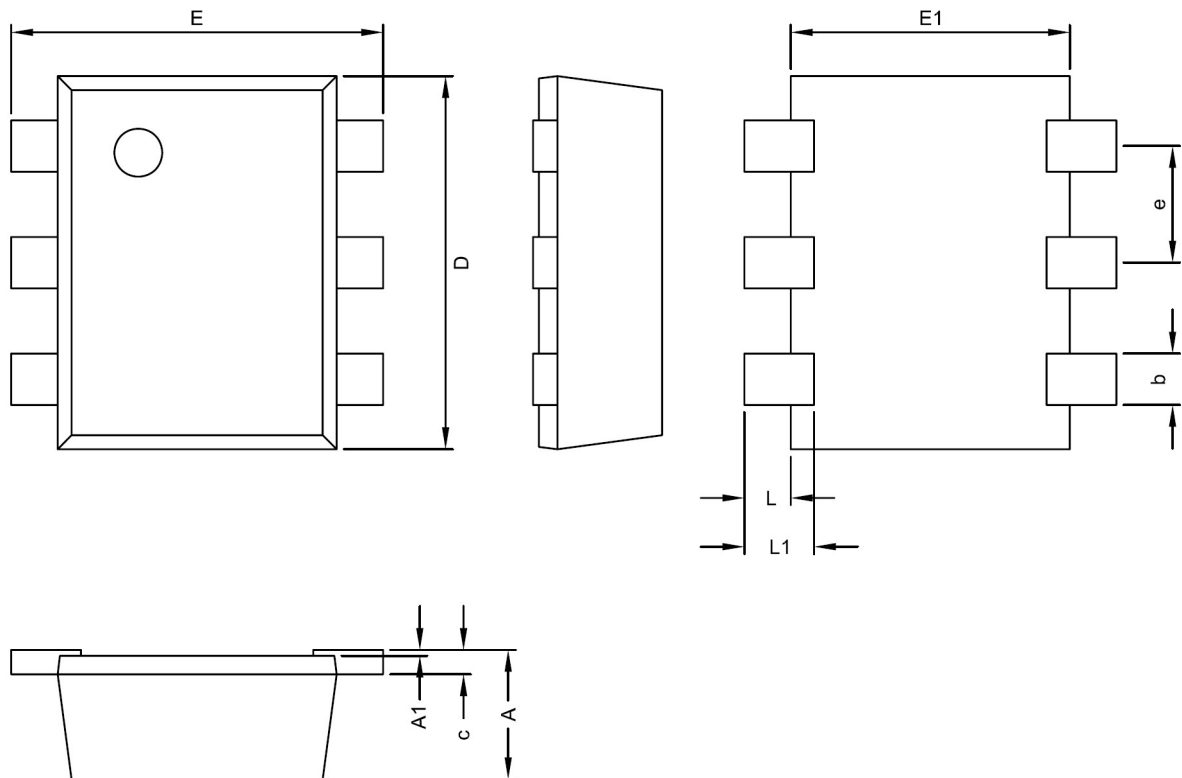
Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	---	---	0.90	---	---	0.035
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70	0.75	0.80	0.028	0.030	0.031
D	2.70	2.90	3.10	0.106	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
c	0.15 REF			0.006 REF		
b	0.30	0.40	0.50	0.012	0.016	0.020
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024

Taping Specification



Feed Direction

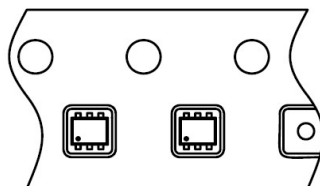
PACKAGE	Q'TY/REEL
TSOT-23-5	3,000 ea



SOT-563 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.525	---	0.600	0.021	---	0.024
A1	0.00	---	0.05	0.000	---	0.002
e	0.500 BSC			0.0197 BSC		
c	0.090	---	0.180	0.004	---	0.007
D	1.500	1.600	1.700	0.059	0.063	0.067
b	0.170	0.220	0.270	0.007	0.009	0.011
E1	1.100	1.200	1.300	0.043	0.047	0.051
E	1.500	1.600	1.700	0.059	0.063	0.067
L	0.100	0.200	0.300	0.004	0.008	0.012
L1	0.200	0.300	0.400	0.008	0.012	0.016

Taping Specification



Feed Direction

PACKAGE	Q'TY/REEL
SOT-563	3,000 ea