杰力科技股份有限公司
Excelliance MOS Corporation

EM5109

3A Low Dropout LDO

General Description

EM5109 is a 3A low dropout linear regulator designed for low dropout and high current applications. This device works with dual supplies, a control input for the control circuitry and a power input as low as 1.05V for providing current to output. It features 3A output current and ultra-low-drop output voltage as well as full protection functions. V_{OUT} can be as low as 0.8V. The other features include soft start, current limit protection, Power-On-Reset function, and over temperature protection. The EM5109 is available in PSOP-8 and DFN3X3 package.

Ordering Information

EM5109(□ □□-□□□)

Soft-Start TSS	Package Type	Output Voltage	Enable Status
□:2.5ms A :1.5ms	GE:PSOP-8 VT:DFN33-10	□□ or 00: ADJ 18: Fixe 1.8V 25: Fixe 2.5V	A: Internal Pull Low □: Internal Pull High

□: Blanking

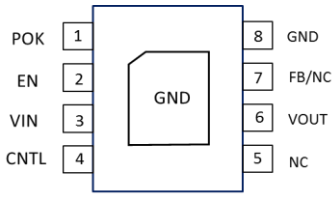
Features

- V_{IN} Range 1.05V to 5.5V
- V_{OUT} is Adjustable (0.8V Min)
- Excellent Line Regulation
- Excellent Load Regulation
- 3A Guaranteed Output Current
- 310mV @ 3A Dropout Voltage
- Internal Fixed 1.8V,2.5V Output
- Enable & Power good Signal
- Current Limit Protection
- Over Temperature Protection

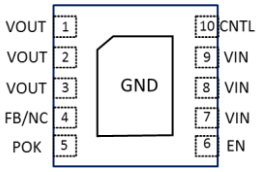
Applications

- Notebook & Netbook
- Graphic Cards & MB
- Low Voltage Logic Supplies
- Chipset Supplies
- Server System
- SMPS Post Regulators

Pin Configuration

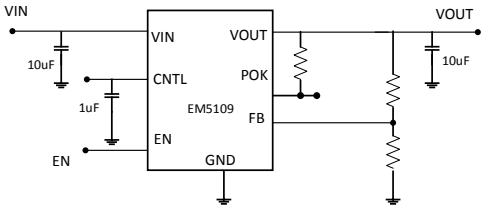


PSOP-8

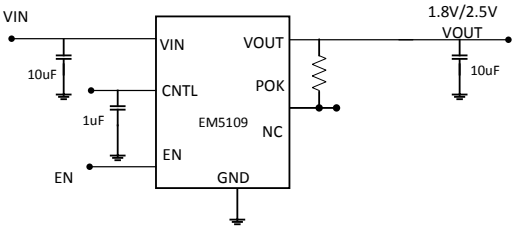


(DFN3X3-10)

Typical Application Circuit



ADJ Output Mode

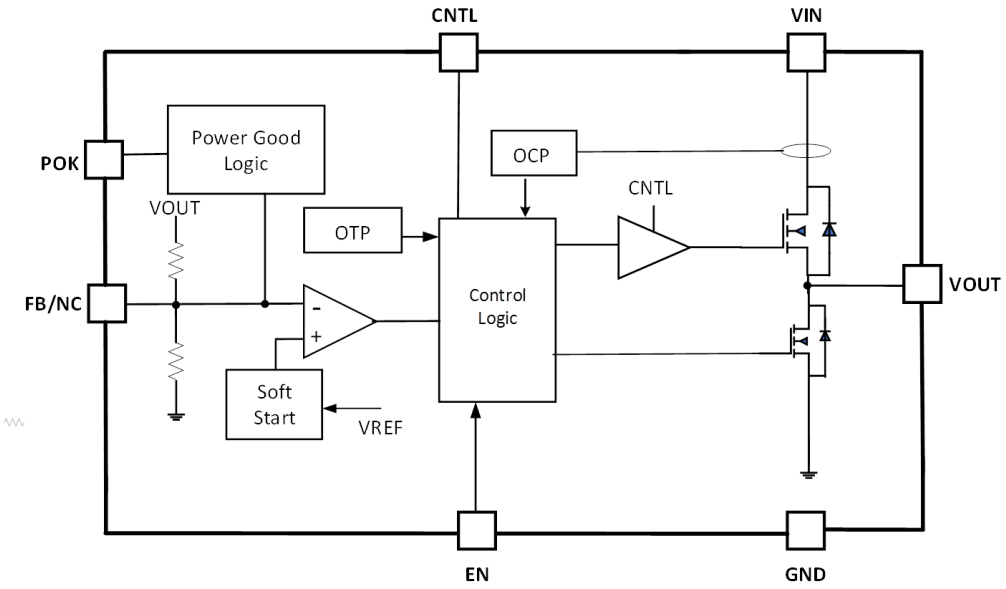


Fixed Output Mode

Pin Assignment

Pin Name	Pin No.		Pin Function
	PSOP-8	DFN3X3-10L	
POK	1	5	**Power OK Indication.** POK is an open-drain output. An external pull high resistor connected to this pin is required.
FB	7	4	**Feedback Voltage.** FB is the inverting input to the error amplifier. A resistor divider from the output to GND is used to set the regulation voltage as V_{OUT} = (1 + R1/R2) x 0.8V (V). This pin has high impedance and should be kept from noisy source to guarantee stable operation.
VOUT	6	1,2,3	**Output Voltage.** V_{OUT} is power output pin. An internal pull low resistance exists when the device is disabled. Minimum 10uF low ESR ceramic holding capacitor is required at this pin for stabilizing V_{OUT} voltage.
VIN	3	7,8,9	**Input Voltage.** This is the drain input to the power device that supplies current to the output pin. Minimum 10uF low ESR ceramic capacitor is recommended at this pin.
EN	2	6	**Enable Input.** Pulling the pin below 0.3V turns the regulator off
CNTL	4	10	**Supply Input for Control Circuit.** CNTL provides supply voltage to the control circuitry and driver for the pass transistor. The driving capability of output current is proportioned to the V_{CNTL}.
GND	8	Exposed Pad	**Ground.**

Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} ---------- -0.3V to +6.0V
- V_{CNTL} ---------- -0.3V to +6.0V
- Other Pins---------- -0.3V to (V_{CNTL}+0.3V)
- Package Thermal Resistance, θ_{JA}, PSOP-8 (Note2)---------- 55°C/W
- Power Dissipation, PD @ TA = 25°C, PSOP-8---------- 2.2 W
- Package Thermal Resistance, θ_{Jc}, PSOP-8 (Note2)---------- 20°C/W
- Package Thermal Resistance, θ_{JA}, DFN3X3-10 (Note2)---------- 65°C/W
- Power Dissipation, PD @ TA = 25°C,DFN3X3-10---------- 1.92 W
- Package Thermal Resistance, θ_{Jc},DFN3X3-10 (Note2)---------- 15°C/W
- Junction Temperature----------150°C
- Lead Temperature (Soldering, 10 sec.)---------- 260°C
- Storage Temperature ---------- –65°C to 150°C
- ESD susceptibility (Note3)
  HBM (Human Body Mode)---------- 2KV
  MM (Machine Mode)---------- 200V
  CDM (Charge Device Mode) ---------- 500V

Recommended Operating Conditions (Note4)

- Control Voltage, V_{CNTL} ---------- +3.0V to +5.5V
- Supply Input Voltage, V_{IN} ---------- +1.05V to V_{CNTL}
- Junction Temperature ---------- –40°C to 125°C
- Ambient Temperature ---------- –40°C to 85°C

Electrical Characteristics

V_{CNTL}=5V, T_A=25°C, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Input Section						
Control Input Voltage	V_{CNTL}	V_{OUT}= V_{REF}	3.0	-	5.5	V
POR Threshold	$V_{CNTLRTH}$		2.5	-	2.9	V
POR Hysteresis	$V_{CNTLHYS}$			0.4		V
Power Input Voltage	V_{IN}	V_{OUT}=V_{REF}	1.05	-	V_{CNTL}	V
VIN POR Threshold	V_{VINTH}		0.8	-	1.0	V
VIN POR Hysteresis	V_{VINHYS}		0.2	-	0.5	V
Shutdown Current	$Iq_{\_SD}$	V_{IN}=V_{CNTL}=5V, I_{OUT}=0A,V_{EN}=0V		10	20	uA
Quiescent Current	I_Q	V_{IN}=V_{CNTL}=V_{EN}=5V, I_{OUT}=0A~3A, V_{OUT}=V_{REF}		0.2		mA
Feedback						
Reference Voltage	V_{REF}	V_{IN}=V_{CNTL}=V_{EN}=5V, I_{OUT}=0A, V_{OUT}=V_{REF}	0.788	0.8	0.812	V
Fixed Output Voltage		Vo=1.8V,2.5V	-1.5		+1.5	%
Feedback Input Current	I_{FB}			20	100	nA
V_{IN} Line Regulation	$V_{REF(LINE1)}$	1.0V<V_{IN}<5V, V_{CNTL}=V_{EN}=5V, I_{OUT}=10mA, V_{OUT}=V_{REF}		0.01	0.1	%/V
V_{CNTL} Line Regulation	$V_{REF(LINE2)}$	3V<V_{CTNL}<5V, V_{IN} =2V, V_{EN}=5V, I_{OUT}=10mA, V_{OUT}=V_{REF}		0.03	0.2	%/V
Load Regulation	$V_{REF(LOAD)}$	0<I_{OUT}<3A, V_{IN}=V_{CNTL}=V_{EN}=5V, V_{OUT}=V_{REF}		0.1	0.5	%

Dropout Voltage	V_{DROP}	I_{OUT}=3A, V_{CNTL}=V_{EN}=5V, V_{OUT}=1.8V VOUT= VOUT-2%		310	380	mV
Output Voltage	V_{OUT}		0.8		V_{CNTL}-1.5	V
Output Ripple Rejection		1KHz (AC Sweep), Note5		70		dB
V_{OUT} Pull Low Resistance		V_{IN}=V_{CNTL}=5V, V_{EN}=0V		85	150	Ω
Enable						
Enable High Level	V_{EN}		1.1	-	-	V
Disable Low Level	V_{SD}		-	-	0.3	V
Enable Pull-high Current	I_{EN}	V_{CNTL}=5V, V_{EN}=0V		5	10	µA
Enable Pull-low Current		V_{CNTL}=5V, V_{EN}= V_{CNTL}		5	10	
Output Turn On Time (EM5109A)	T_{SS}	V_{OUT} Rising 10% to 90%		1.5		mS
	T_D	V_{EN} Rising 50% to V_{OUT} Rising 10%		0.7		mS
Output Turn On Time (EM5109)	T_{SS}	V_{OUT} Rising 10% to 90%		2.5		mS
	T_D	V_{EN} Rising 50% to V_{OUT} Rising 10%		1		mS
PWROK						
POK Threshold	V_{POKTH_R}	VFB Rising	90	-	94	%
	V_{POKTH_F}	VFB Falling	80	-	84	%
POK Sinking Voltage	V_{POK}	sinking current= 5mA	0	-	0.4	V
POK React Time	T_{PG}	VFB 90% to POK active (EM5109A)	0.2	0.35	0.5	mS
		VFB 90% to POK active (EM5109)	0.5	1	2	mS
POK OFF deglitch time	T_{PGF}	VFB Falling to POK low		3	5	uS
		Disable to POK low				
Protection						
OCP Threshold Level	I_{OCP}	V_{IN}=V_{CNTL}=V_{EN}=5V, V_{OUT}=V_{REF}	4.6	5.7	6.8	A
Thermal Protection						
Thermal Shutdown Temperature	T_{SD}	V_{IN}=V_{CNTL}=V_{EN}=5V, I_{OUT}=0A, V_{OUT}=V_{REF}		150		C
Thermal Shutdown Hysteresis	T_{SDHYS}	V_{IN}=V_{CNTL}=V_{EN}=5V, I_{OUT}=0A, V_{OUT}=V_{REF}		40		C

Note 1. Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. 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 remain possibility to affect device reliability.

Note 2. θ_{JA} is measured in the natural convection at T_A=25°C on a 2-layers high effective thermal conductivity test board with minimum copper area of JEDEC 51-7 thermal measurement standard.

Note 3. Devices are ESD sensitive. Handling precaution is recommended.

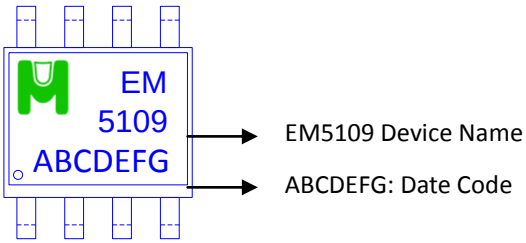
Note 4. The device is not guaranteed to function outside its operating conditions.

Note 5. Design guarantee, not production test.

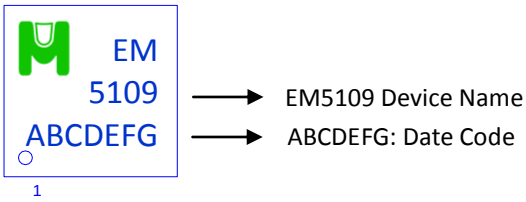
Note 6 . EMC will review datasheet by quarter, and update new version.

Ordering & Marking Information

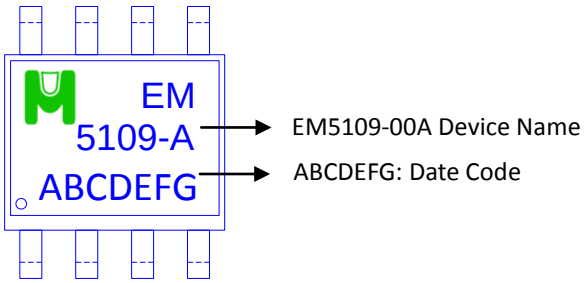
Device Name: EM5109GE for PSOP-8



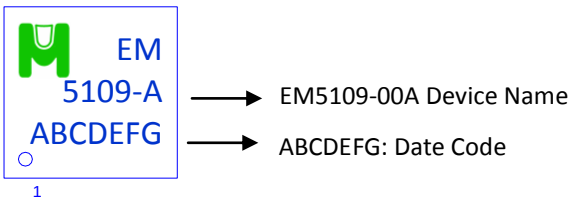
Device Name: EM5109VT for DFN3X3-10L



Device Name: EM5109GE-00A for PSOP-8

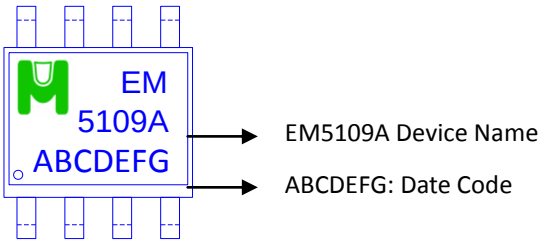


Device Name: EM5109VT-00A for DFN3X3-10L

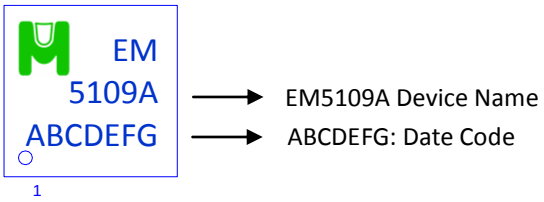


Ordering & Marking Information

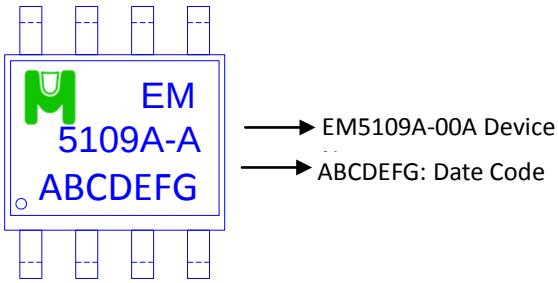
Device Name: EM5109AGE for PSOP-8



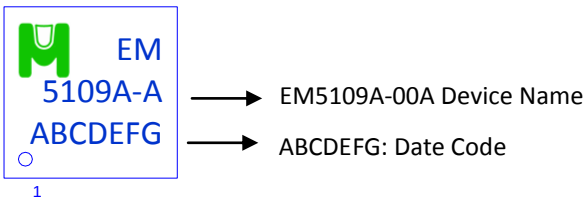
Device Name: EM5109AVT for DFN3X3-10L



Device Name: EM5109AGE-00A for PSOP-8

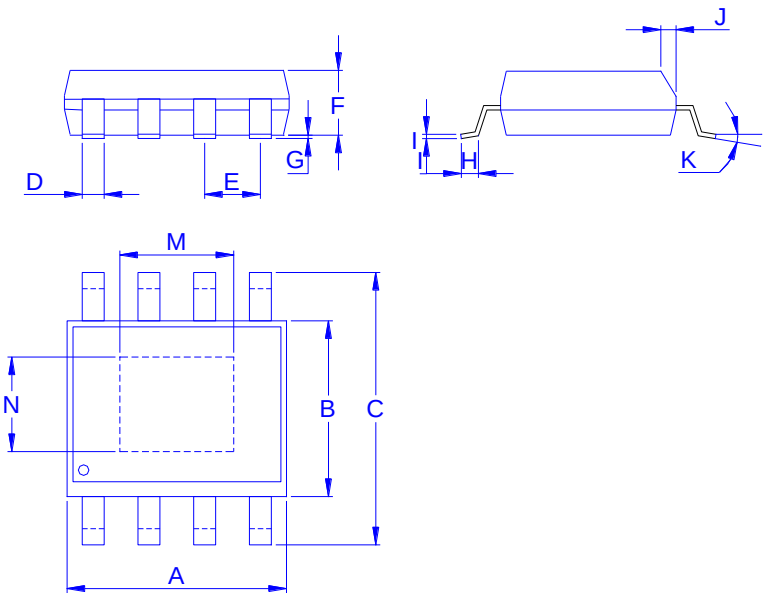


Device Name: EM5109AVT-00A for DFN3X3-10L



Outline Drawing

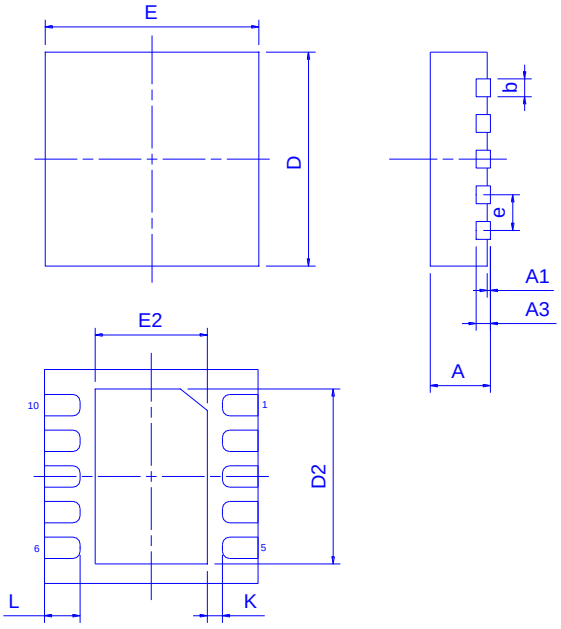
PSOP-8



Dimension in mm

Dimension	A	B	C	D	E	F	G	H	I	J	K	M	N
Min.	4.70	3.70	5.80	0.33		1.20	0.02	0.40	0.19	0.25	0°	1.94	1.94
Typ.					1.27								
Max.	5.10	4.10	6.20	0.51		1.62	0.15	0.83	0.26	0.50	8°	2.49	2.49

DFN3X3-10L

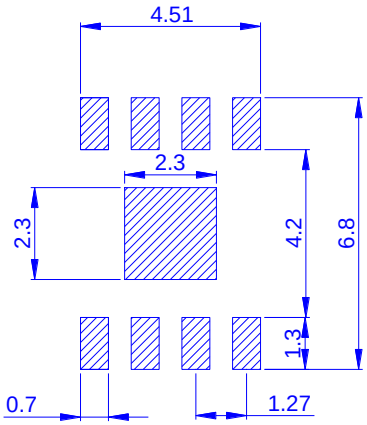


Dimension in mm

Dimension	A	A1	A3	b	D	E	D2	E2	e	L	K
Min.	0.7	0.00		0.18			2.20	1.40		0.30	0.20
Typ.	0.75	0.02	0.2	0.25	3.0	3.0			0.50	0.40	
Max.	0.80	0.05		0.30			2.70	1.75		0.50	

Recommended minimum pads

PSOP-8



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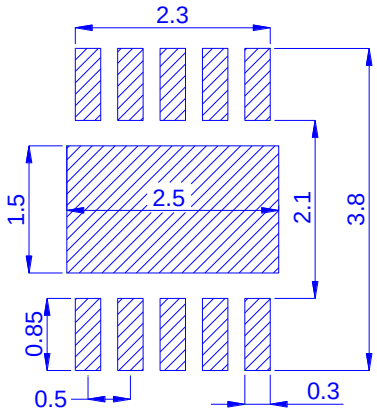
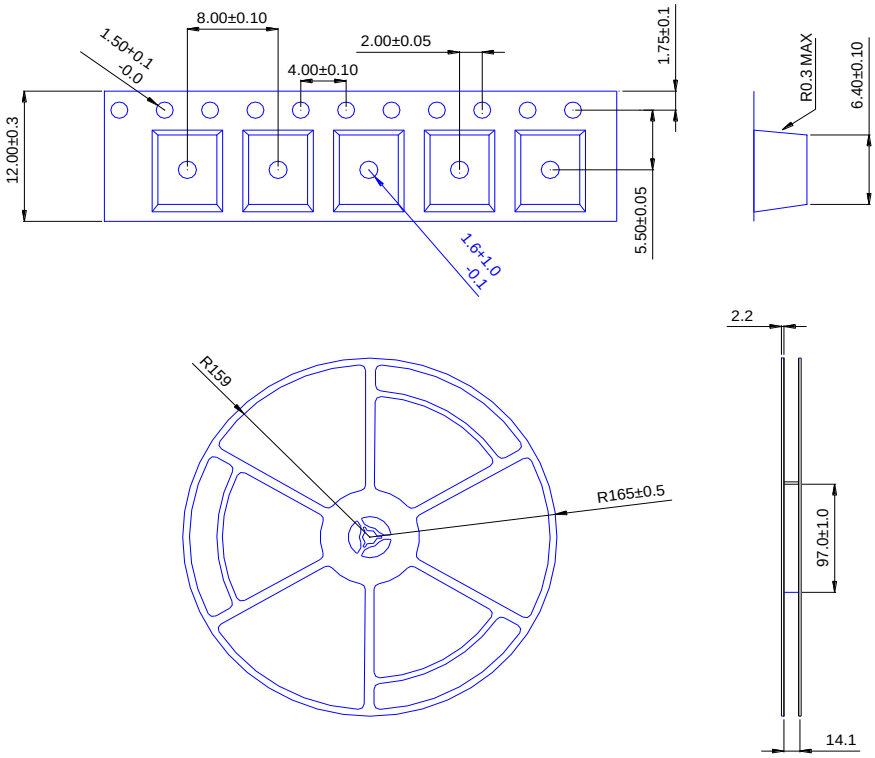
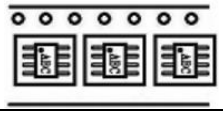


PSOP-8

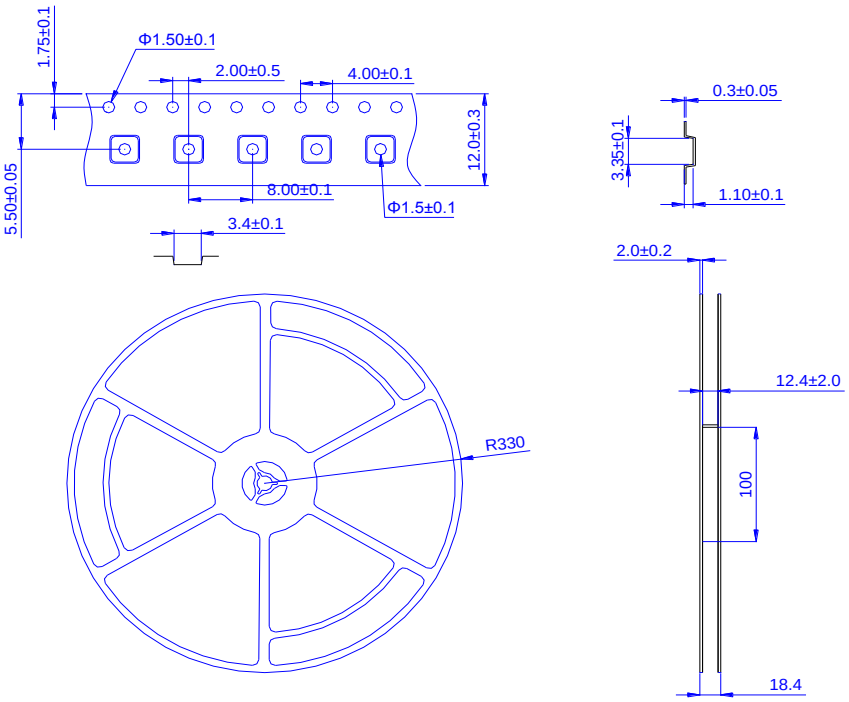
◆ Tape&Reel Information:2500pcs/Reel

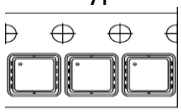


產品別	PSOP-8
Reel 尺寸	13”
編帶方式	L-Type 
前空格	25
後空格	50
滿捲數量	2.5K
捲/內盒比	1：1
內盒滿箱數	2.5K
內/外箱比	10：1
外箱滿箱數	25K
導電袋(mm)	500 * 375 * 0.1
保護帶(mm)	108 ± 1* 1.6 ± 0.05 * 0.1 ± 0.01
內盒尺寸(mm)	351 * 339 * 31
外箱尺寸(mm)	384 * 360 * 360

DFN3X3-10L

◆ Tape & Reel Information : 5000pcs/Reel



產品別	DFN3X3-10L
Reel 尺寸	13”
編帶方式	L-Type 
前空格	50
後空格	50
	裝箱數
滿捲數量	5K
捲/內盒比	1 : 1
內盒滿箱數	5K
內/外箱比	10 : 1
外箱滿箱數	50K
	包裝材料規格
導電袋(mm)	500 * 375 * 0.1
保護帶(mm)	108 ± 1* 1.6 ± 0.05 * 0.1 ± 0.01
內盒尺寸(mm)	351 * 339 * 31
外箱尺寸(mm)	384 * 360 * 360