

General Description

The LTP8P22A is a high-performance low-dropout linear regulator with 20V and 200mA, featuring ultra-low noise of $0.8\mu\text{V}_{\text{RMS}}$ and an ultra-high power supply rejection ratio of 112dB. It supports adjustable output from 1.2V to $V_{\text{IN}} - V_{\text{DROP}}$ using a single resistor and remains stable with capacitance in the range of $4.7\mu\text{F}$ to $100\mu\text{F}$. It achieves precise current reference and high-performance voltage buffering. By connecting an external capacitor to the current reference, the output voltage noise can be further reduced.

The LTP8P22A has an adjustable output current limit using an external resistor, as well as an adjustable power good threshold through an external resistor divider. It also integrates overcurrent protection and overtemperature protection to enhance system reliability.

The product is available in EMSOP-10L and DFN 3x3-10L packages, with an operating temperature range of -45°C to $+125^{\circ}\text{C}$.

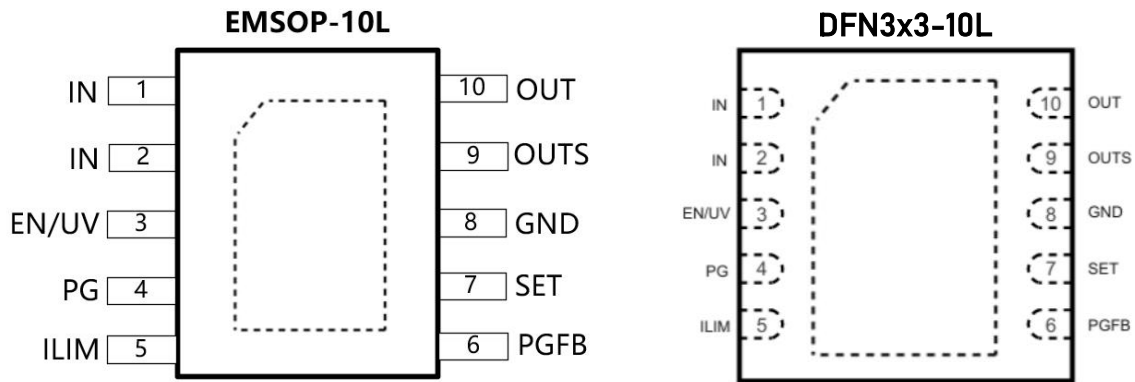
Features and Benefits

- Input voltage range: 2.5V to 20V
- Output voltage range: 1.2V to $V_{\text{IN}} - V_{\text{DROP}}$
- Low noise: $0.8\mu\text{V}_{\text{RMS}}$
- Power Supply Rejection Ratio (PSRR):
 - 112dB (1kHz)
 - 111dB (10kHz)
 - 102dB (100kHz)
- Initial accuracy: $< \pm 2\%$ at 25°C
- Low dropout ($I_{\text{OUT}}=200\text{mA}$):
 - 280mV ($V_{\text{OUT}}=3.3\text{V}$, Typ.)
- Single capacitor improves noise and PSRR
- Programmable current limit
- High-precision Enable EN/UVLO

Applications

- Ultra-low noise instruments
- RF Power Supply: PLL, VCO, Mixer, Low Noise Amplifier
- Medical applications: imaging, diagnosis
- High-precision power supply

Pin Description (Top View)



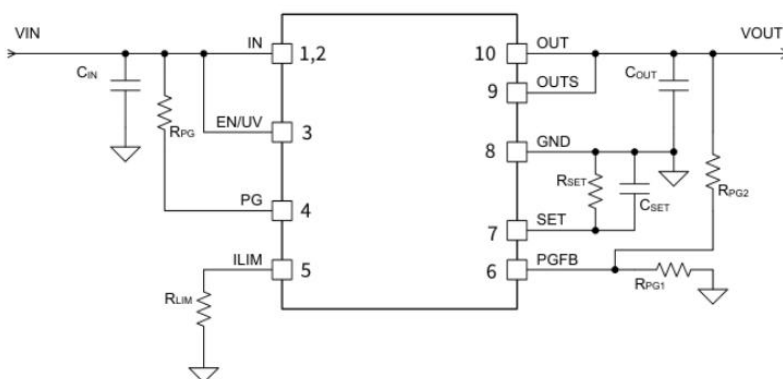
Pin Function

PackageNC		Symbol	Function
EMSOP-10L	DFN3x3-10L		
1, 2	1, 2	IN	For the voltage regulator input power, it is recommended to use a 4.7μF capacitor decoupled to GND (close to the chip pin).
3	3	EN/UV	Enable control pin, active high, can also be directly connected to V_{IN} or use a resistor voltage divider.
4	4	PG	Power Good open-drain output pin, can be left floating if not used. After the supply voltage exceeds the threshold set by PGFB, the PG pin outputs a high-impedance state.
5	5	ILIM	Current limiting adjustment pin, use a resistor with appropriate resistance to GND to set the current limit value; you can also directly short it to GND to use the internal default current limit of 345mA. When using an external resistor, the relationship between the current limit and the external resistor is: $I_{LIM} = 125 / R_{LIM}$. For example, when $R_{LIM} = 2.5k\Omega$, the current limit $I_{LIM} = 50mA$.
6	6	PGFB	Power Good threshold setting pin, threshold is around 300mV, using external voltage divider resistors connected from OUT and PGFB to GND; if this function is not used, it can be directly connected to V_{IN} ; note that this pin cannot be left floating. When using external resistor voltage divider, the Power Good threshold and resistors relationship is: $V_{th_PG} = 0.3 \times (1 + R_{PG2}/R_{PG1})$
7	7	SET	Output voltage setting pin, should use high-precision resistor connected to GND, $V_{OUT} = R_{SET} \times 100\mu A$, it is recommended to use a 4.7μF capacitor to decouple this pin to GND.
8, EPAD	8, EPAD	GND	Chip ground, directly connected to the PCB ground plane.
9	9	OUTS	Output voltage sensing input pin, connect OUTS to the output capacitor and load using Kelvin connection.
10	10	OUT	Output voltage pin, it is recommended to use a 4.7μF capacitor for decoupling to GND (close to the chip pin)

Ordering Information

Type Number	Package Name	Package Quantity	Mark Code
LTP8P22ANXV10/R8	EMSOP-10L	Tape and Reel, 4 000	HPLN
LTP8P22ANXF10/R6	DFN3x3-10L	Tape and Reel, 3 000	HPLN

Internal module block diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
VIN to GND	V_{IN}	-0.3 to +22	V
EN to GND	EN	-0.3 to +22	V
VOUT, OUTs, SET to GND	VOUT, OUTs, SET	-0.3 to +22	V
PG, PGFB to GND	PG, PGFB	-0.3 to +22	V
OUT-OUTs		-1.2 to +1.2	V
SET-OUTs		-0.7 to +0.7	V
Storage Temperature	T_{STG}	-55 to +150	°C
Operating Junction Temperature Range	T_J	+150	°C
Operating Temperature Range	T_A	-45 to +125	°C
Welding conditions		JEDEC J-STD-020	
Thermal resistance	θ_{JA}	100	°C/W

ESD Ratings

Parameter	Level	Unit
Human body model (HBM), per ANSI/ESDA/JEDEC JS-001	±8 000	V
Charged device model (CDM), per ANSI/ESDA/JEDEC JS-002	±2 000	

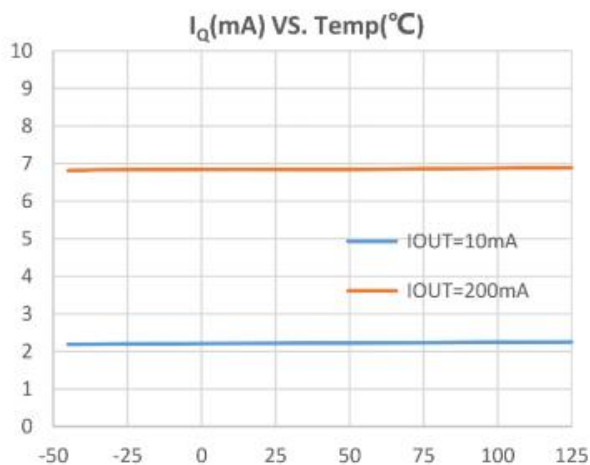
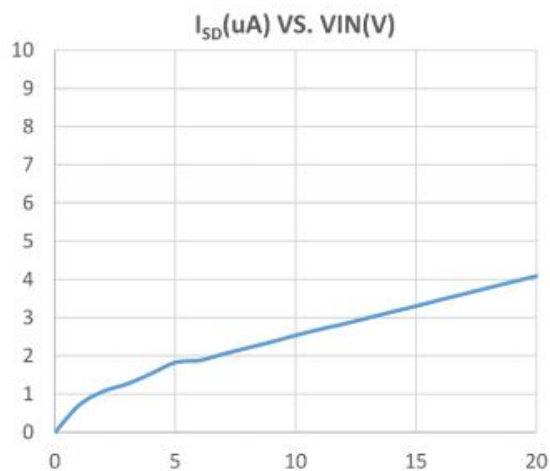
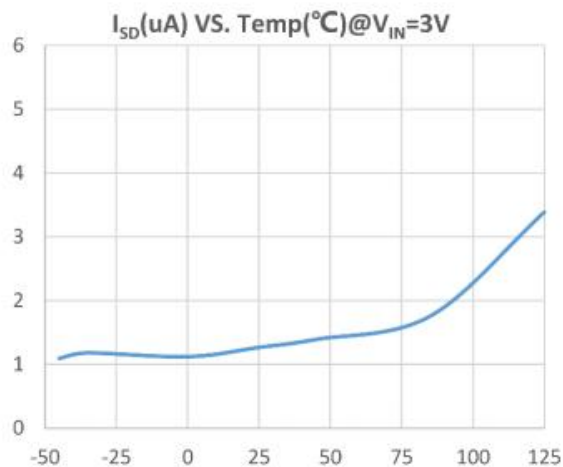
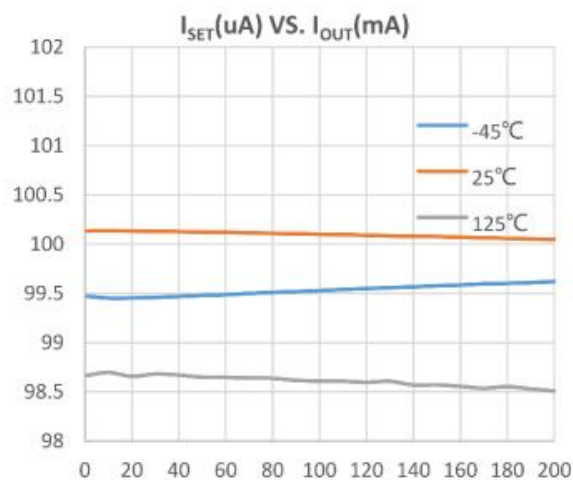
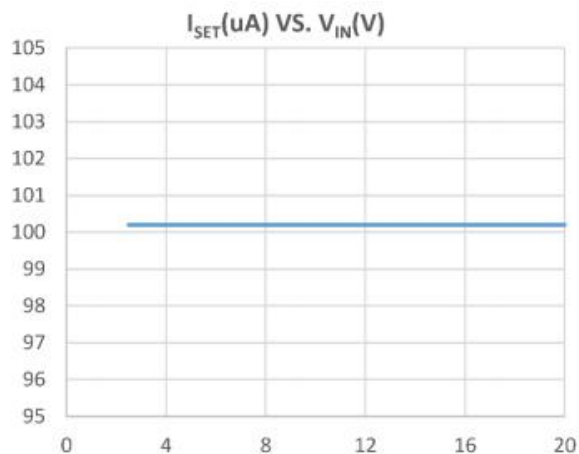
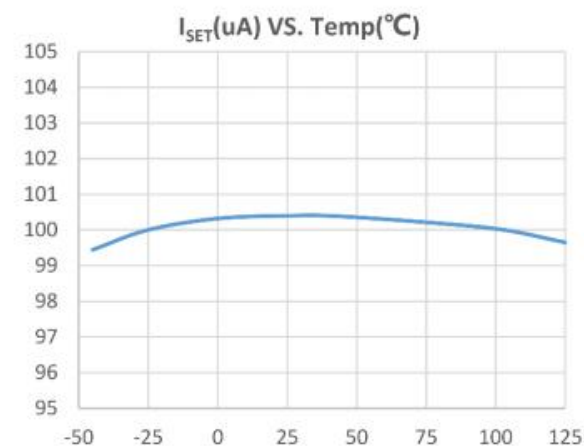
Electrical Characteristics

Unless otherwise specified, $V_{OUT} = 1.2V$, $V_{IN} = V_{OUT} + 1V$ or $2.5V$ (whichever is greater), OUT is directly connected to OUTS, $V_{EN} = 2V$, $I_{OUT} = 10mA$, $C_{IN} = C_{OUT} = C_{SET} = 4.7\mu F$, $T_A = -45^{\circ}C$ to $125^{\circ}C$

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input voltage	V_{IN}		2.5		20	V
Under-voltage shutdown	$V_{IN, UVLO}$	rising	1.75	2	2.1	V
		falling	1.7	1.9	2	
Quiescent Current	I_Q	$I_{OUT} = 10\mu A$	2.3	2.6	3	mA
		$I_{OUT} = 1mA$	2.3	2.6	3	
		$I_{OUT} = 50mA$	3.5	3.8	4.5	
		$I_{OUT} = 100mA$	4.8	5.1	6	
Shutdown Power Consumption	I_{SD}	$V_{EN/UV} = 0V$	1	1.6	5	μA
EN Decision Threshold	$V_{EN/UV}$	$V_{EN/UV}$ rising	1.2	1.25	1.3	V
		$V_{EN/UV}$ falling	1.1	1.15	1.2	
PGFB Decision Threshold	V_{PGFB}	V_{PGFB} rising	300	307	315	mV
		V_{PGFB} falling	290	298	306	
SET pin current	I_{SET}	$V_{IN}=2.5V$ to $20V$, $I_{OUT}=1mA$ to $200mA$	98	102	104	μA
Dropout Voltage	V_{DROP}	$V_{OUT}=3.3V$, $I_{OUT}=20mA$	240	250	300	mV
		$V_{OUT}=3.3V$, $I_{OUT}=100mA$	240	255	300	
		$V_{OUT}=3.3V$, $I_{OUT}=200mA$	270	280	330	
Internal current limit	I_{CL}	$V_{IN}=2.5V$ to $20V$, $V_{OUT}=0V$	330	345	360	mA
Start time	t_{STR}	$V_{IN}=6V$, $V_{OUT}=5V$, $I_{LOAD}=200mA$, $C_{SET}=4.7\mu F$, $V_{PGFB}=6V$		500		ms
Power Supply Rejection Ratio	PSRR	$f=1kHz$		112		dB
		$f=10kHz$		111		
		$f=100kHz$		102		
Output noise	V_{NOISE}	$f=10Hz$ to $100kHz$		0.8		μV_{rms}
Over-temperature protection	T_{SD}			160		$^{\circ}C$
Over-temperature protection hysteresis				30		$^{\circ}C$

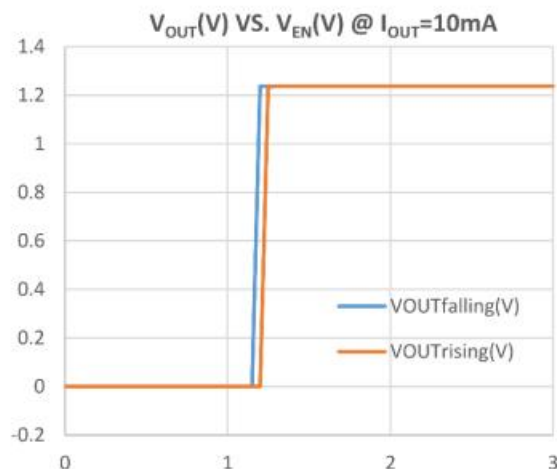
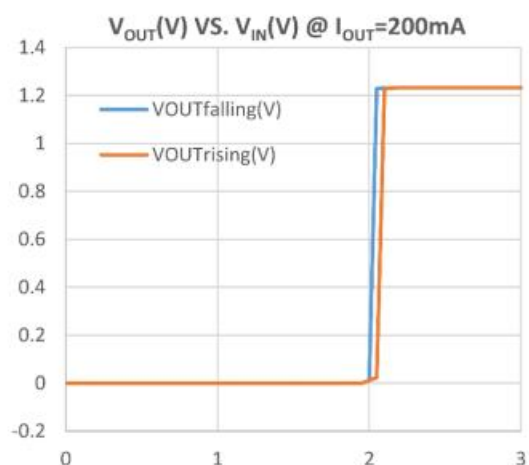
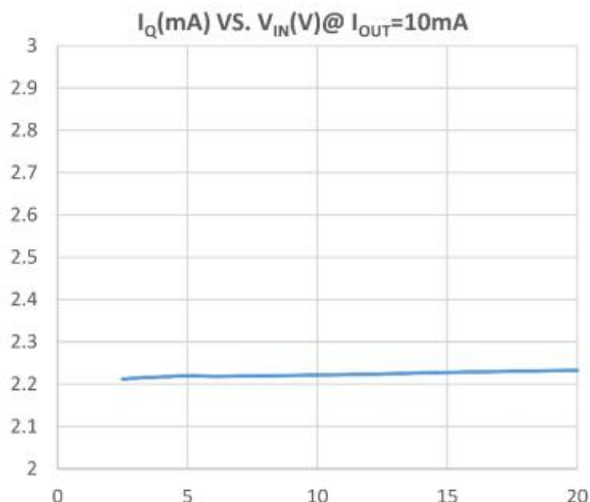
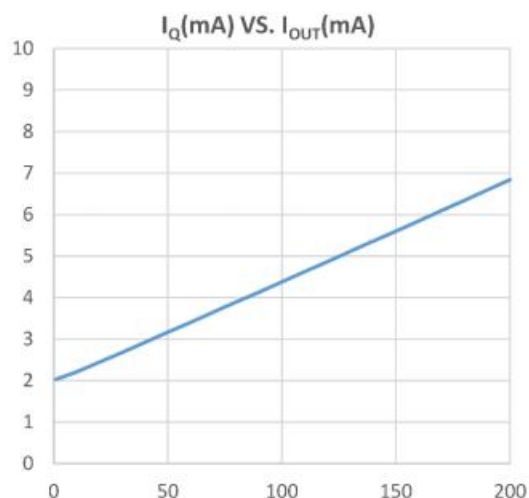
Typical Performance Characteristics

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Typical Performance Characteristics (Cont.)

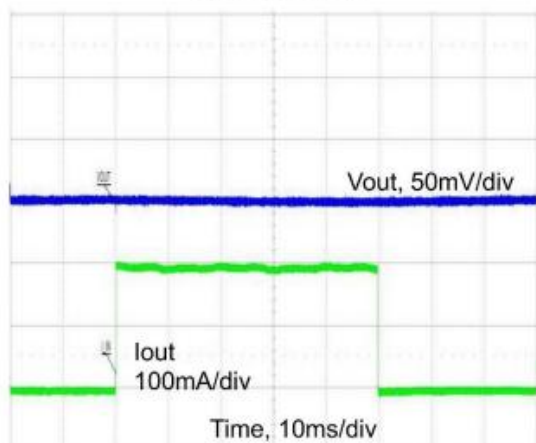
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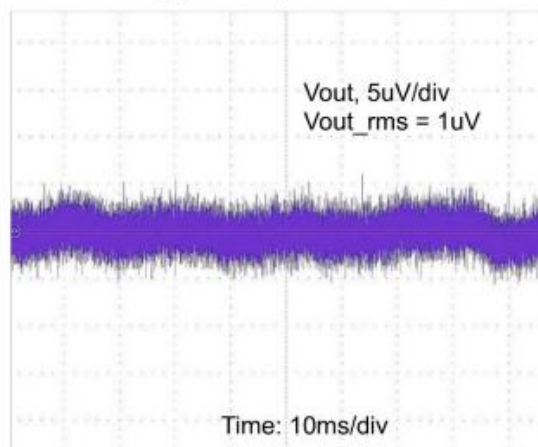
Typical Performance Characteristics (Cont.)

Unless otherwise specified, $V_{OUT} = 1.2V$, $V_{IN} = V_{OUT} + 1V$ or $2.5V$ (whichever is greater), OUT is directly connected to OUTs, $V_{EN} = 2V$, $I_{OUT} = 10mA$, $C_{IN} = C_{OUT} = C_{SET} = 4.7\mu F$, $T_A = -45^{\circ}C$ to $125^{\circ}C$

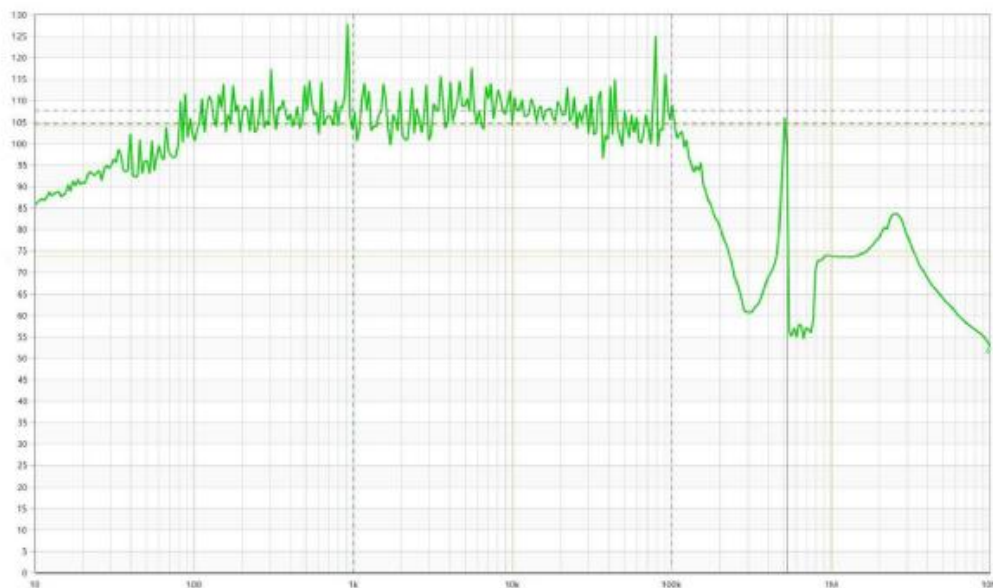
Load Transient



Typical Output Noise

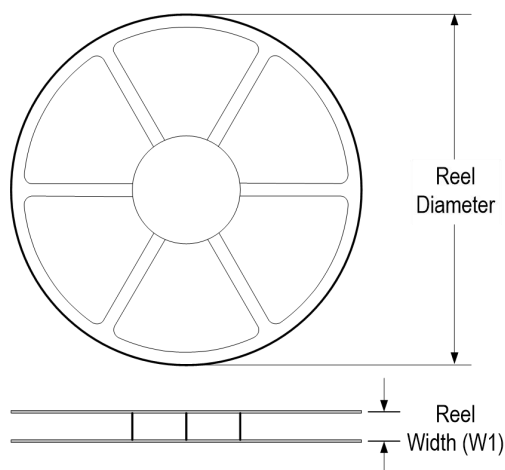


PSRR(dB) VS. Frequency(Hz) @ $V_{IN}=2.5V$, $V_{OUT}=1.2V$, $I_{LOAD}=1mA$

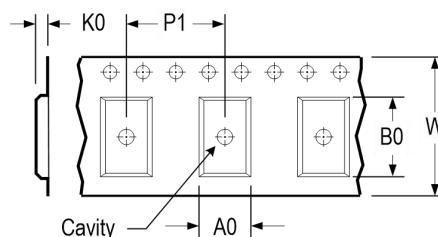


Tape and Reel Information

REEL DIMENSIONS

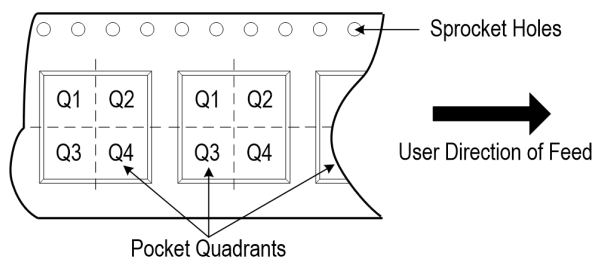


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

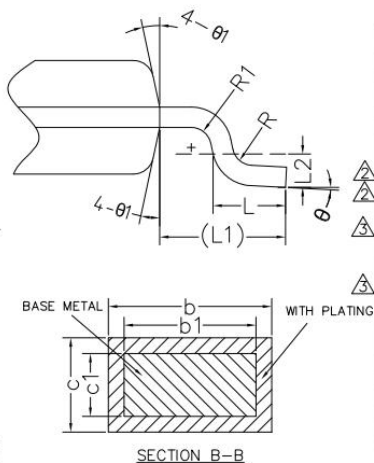
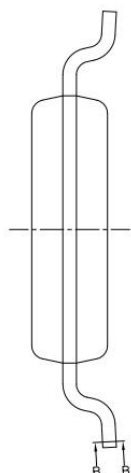
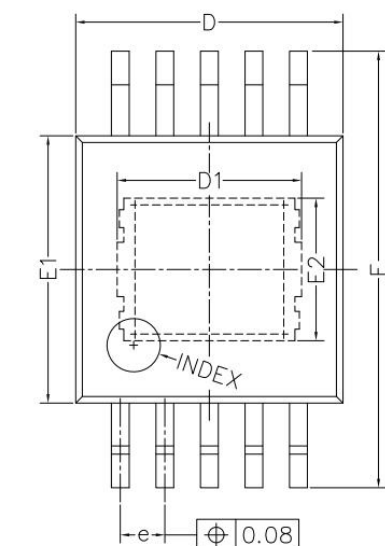


* All dimensions are nominal

Device	Package Type	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin 1 Quadrant
LTP8P22ANXV10/R8	EMSOP	10	4 000	330	12.5	6.6	5.3	2.0	8.0	12.0	Q1
LTP8P22ANXF10/R6	DFN3x3	10	3 000	330	12.5	3.3	3.3	1.0	4.0	12.0	Q1

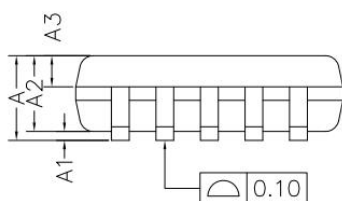
Package Dimension

EMSOP-10L



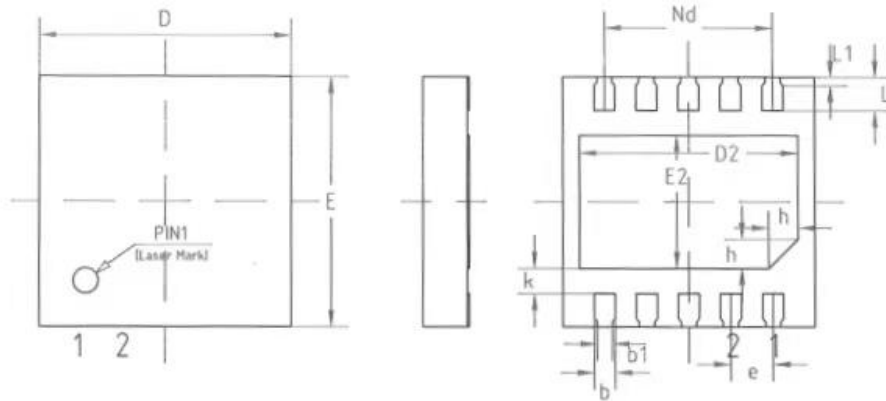
COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	—	—	1.10
A1	0.05	0.10	0.15
A2	0.75	0.85	0.95
A3	0.30	0.35	0.40
b	0.18	—	0.27
b1	0.17	0.20	0.23
c	0.13	—	0.20
c1	0.13	0.15	0.16
D	2.90	3.00	3.10
D1	1.92	2.07	2.22
E	4.75	4.90	5.05
E1	2.90	3.00	3.10
E2	1.45	1.60	1.75
e	0.40	0.50	0.60
L	0.40	0.55	0.70
L1	0.95REF		
L2	0.25BSC		
R	0.07	—	—
R1	0.07	—	—
θ	0°	—	8°
θ1	9°	12°	15°

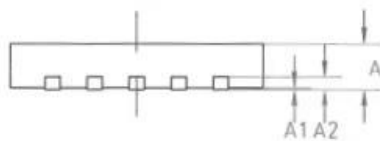


Package Dimension (Cont.)

DFN3x3-10L



SIDE VIEW
侧视图



机械尺寸/mm			
字符 SYMBOL	最小值 MIN	典型值 NOMINAL	最大值 MAX
A	0.50	0.55	0.60
A1	-	0.02	0.05
A2	0.152 REF		
b	0.20	0.25	0.30
b1	0.18 REF		
D	2.90	3.00	3.10
D2	2.50	2.60	2.70
E	2.90	3.00	3.10
E2	1.50	1.60	1.70
e	0.50 BSC		
K	0.25	0.30	0.35
L	0.30	0.40	0.50
L1	0.10 REF		
h	0.30	0.35	0.40
Nd	2.00 BSC		

Important Notice

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