

RAIL CURRENT MEASUREMENT IC

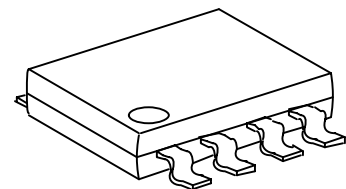
GENERAL DESCRIPTION

The FP130 is a wide input common mode voltage range IC for the rail current measurement of the power system such as battery charger or switching power supply applications field. The FP130 includes a differential input voltage of amplifier to detect the rail current, and converts a voltage by a formula with an external resistance.

The FP130 is used a SOP8 package for a wide power supply range and temperature range application. The example of application circuits please sees as below.

FEATURES

- Wide supply voltage operating range: 2.7 to 30V
- Low current consumption: Standby 300 μ A
- Wide common-mode voltage range: 2.7 to 30V
- Wide temperature range: -25 to +85
- Easy gain set by a external resistance
- Package: SOP8

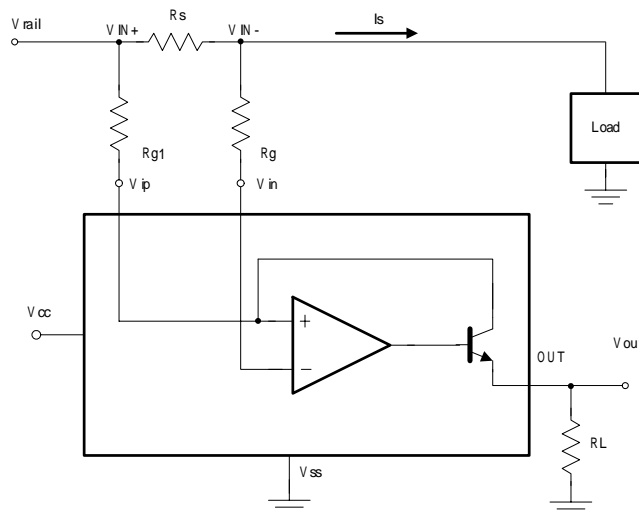


SOP8

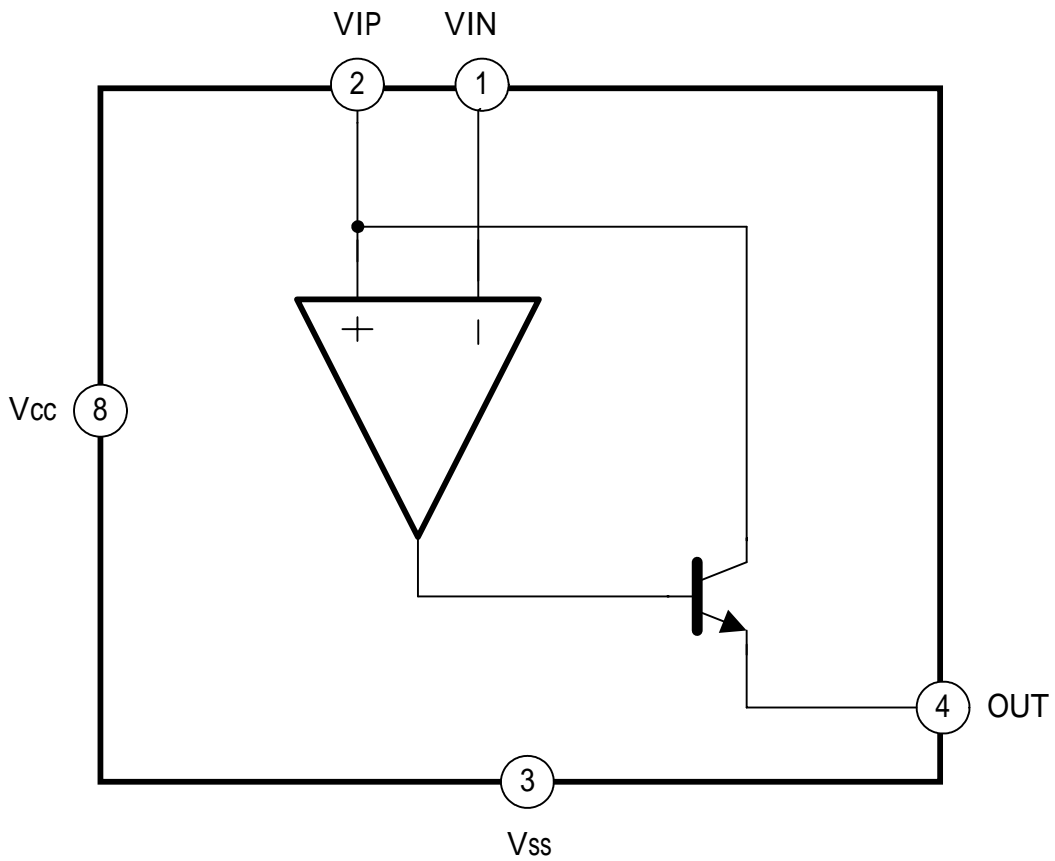
APPLICATION

- Battery charger
- Rail current detector
- Portable Equipment
- SPS(Adaptor)
- Networking system

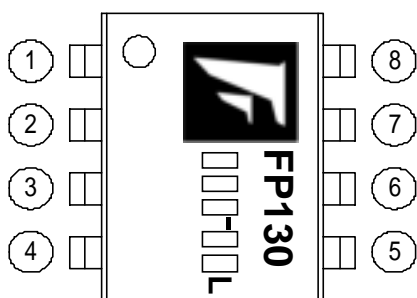
TYPICAL APPLICATION CIRCUITS



FUNCTIONAL BLOCK DIAGRAM



MARK VIEW



PIN DESCRIPTION

Name	No.	I/O	Description
VIN	1	I	Negative input of differential OPA
VIP	2	I	Positive input of differential OPA
GND	3	P	IC ground
OUT	4	O	Current detect output
VCC	8	P	IC power supply

ABSOLUTE MAXIMUM RATINGS

Supply Voltage ----- 0.3V ~ 35V

Common Mode Inputs Voltage ----- -0.3 V ~ 35V

Differential Inputs Voltage ($V_{IP} - V_{IN}$) ----- -35V ~ 1.5V

OUT Voltage ----- -0.3V ~ 35V

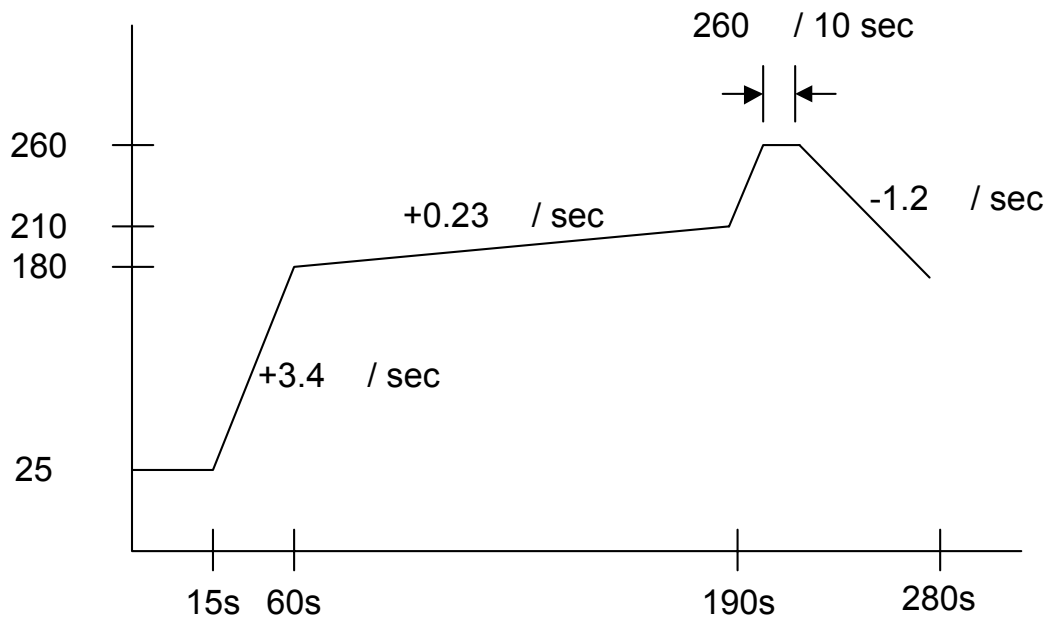
Operating Temperature ----- -20 ~ 125

Storage Temperature ----- -55 ~ 125

Junction Temperature ----- +150

Power Dissipation (SOP8, $T_a=25$) ----- 570mW

SOP8 Lead Temperature (soldering, 10 sec) ----- +260



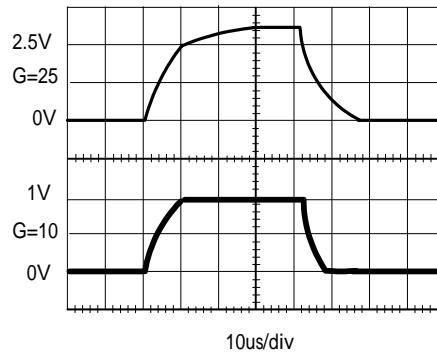
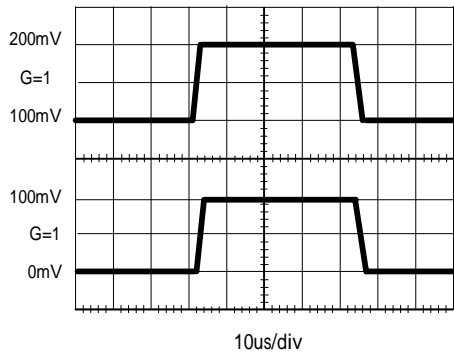
DC ELECTRICAL CHARACTERISTICS

Test conditions: $T_a = -25 \sim +85$, $V_{CC} = 5V$, $V_{IP} = 12V$, $R_{OUT} = 125K\Omega$, unless otherwise noted

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Full Scale Sense Voltage	V_{SENSE}	$V_{SENSE} = V_{IN^+} - V_{IN^-}$		100	500	mV
Common-Mode Input Voltage	V_{CM}		2.7		30	V
Common-Mode Rejection	CMRR	$V_{IN^+} = 2.7V$ to $30V$, $V_{SENSE} = 50mV$	100	120		dB
Input Offset Voltage vs temp	$V_{OFFSET(ta)}$	T_{MIN} to T_{MAX}		4		$\mu V/$
Input Offset Voltage vs V_{CC}	$V_{OFFSET(vcc)}$	$V = -2.7V$ to $30V$, $V_{SENSE} = 50mV$		2.5	10	$\mu V/V$
Input Bias Current	I_{BIAS}	V_{IN^+}, V_{IN^-}		2		μA
Non-linearity Error	NLE	$V_{SENSE} = 10mV$ to $150mV$		± 0.01		%
Total Output Error	TOE	$V_{SENSE} = 100mV$		± 0.5		%
Output Impedance	R_{OUT}			$1 5$		$G\Omega pF$
Voltage Swing to V_{CC}	V_{SCC}			$V_{CC} - 0.8$		V
Voltage Swing to V_{CM}	V_{SCM}			$V_{CM} - 0.5$		V
Bandwidth	BW	$R_{OUT} = 125K$		32		kHz
Setting Time	t_s	$5V$ Setp, $R_{OUT} = 125K$		30		μS
Total Output-Current Noise	I_{NOISE}	$BW = 100KHz$		3		nA
Operating Voltage Range	V_{CC}		2.7		30	V
Quiescent Current	I_{CC}	$V_{SENSE} = 0, I_o = 0$		300	350	μA
Operating Temperature Range	T_A		-25		85	

TYPICAL PERFORMANCE CURVES

At=+25, V+=5V, V_{IN}⁺=12V, R_L=125K



DETAILED DESCRIPTION

Figure 1 shows the basic circuit diagram for the FP130. Load current, I_s , is drawn from supply, V_s , through shunt resistor, R_s . The voltage drop in the shunt resistor, V_s , is forced across R_{g1} by the internal op-amp, causing current to flow into the collector of Q1. External resistor, R_L , converts the output current to a voltage, V_{out} , at the Out pin.

The transfer function for the FP130 is:

$$I_o = g_m (V_{IN}^+ - V_{IN}^-) \quad (1)$$

$$\text{Where } g_m = 1/R_{g1} \quad (2)$$

In the circuit of Figure 1, the input voltage, $(V_{IN}^+ - V_{IN}^-)$, is equal to $I_s R_s$ and the output voltage, V_{out} , is equal to $I_o R_L$. The complete transfer function for the current measurement amplifier in this application is:

$$V_{out} = (I_s)(R_s) g_m R_L \quad (3)$$

The maximum different input voltage for accurate measurements is 0.5V. A different input voltage of up to 1.5V will not cause damage. Different measurements (pins 1 and 2) must be unipolar with a more-positive voltage applied to pin 2. If a more-negative voltage is applied to pin 2, the output current, I_o , will be zero, but it will not cause damage.

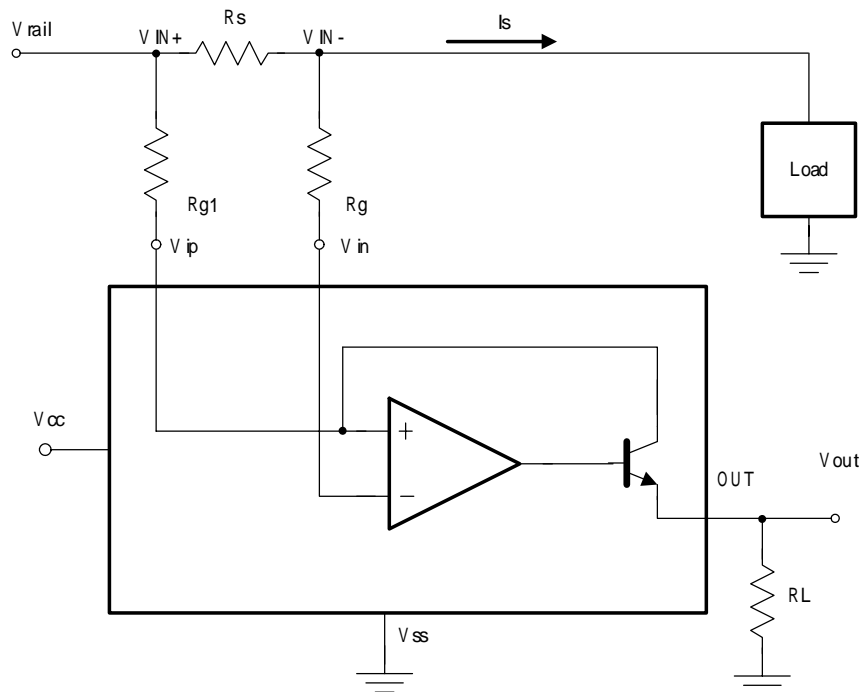
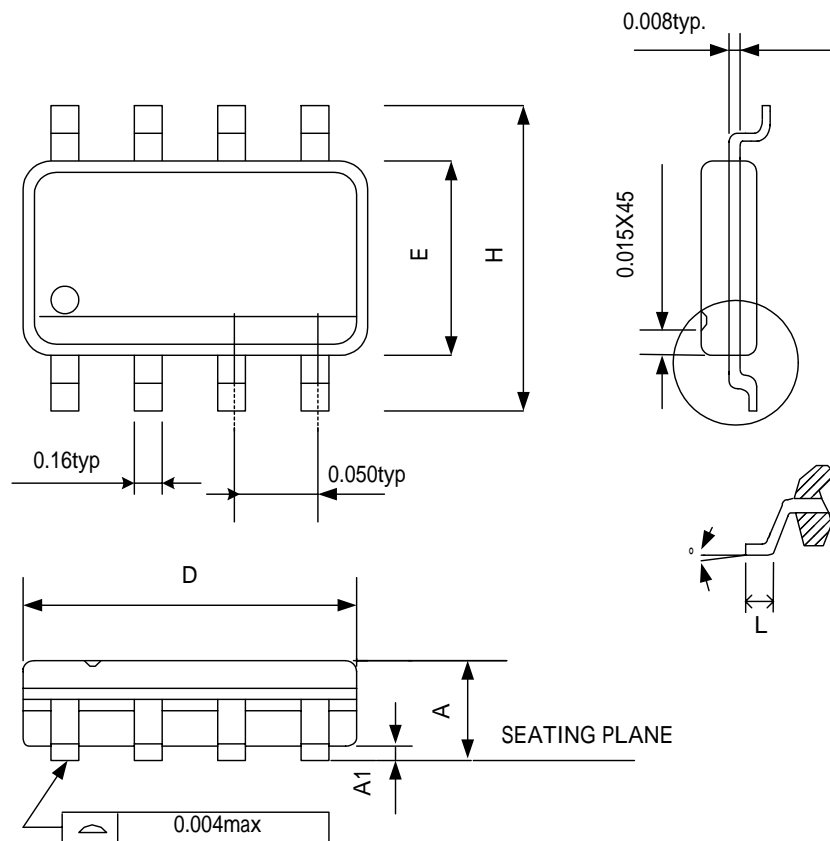


Figure 1. Current measurement circuit

PACKAGE OUTLINE



SYMBOLS	MIN	MAX
A	0.053	0.069
A1	0.004	0.010
D	0.189	0.196
E	0.150	0.157
H	0.228	0.244
L	0.016	0.050
°	0	8

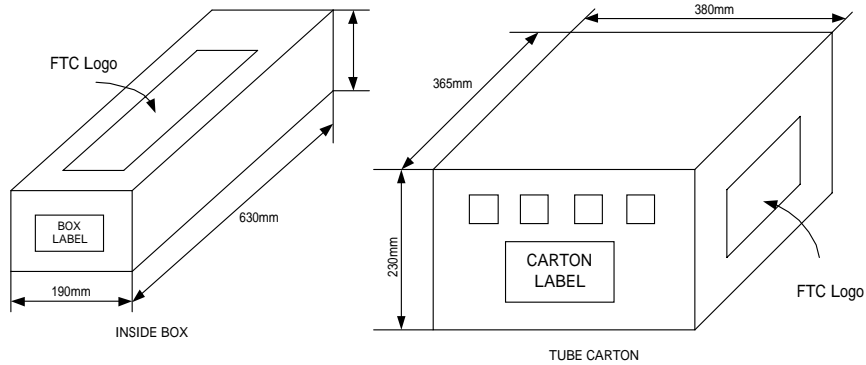
NOTE:

1. JEDEC OUTLINE:MS-012 AA
2. DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH,PROTRUSIONS OR GATE BURRS.MOLD FLASH,PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .15mm (.0.06in) PER SIDE
3. DIMENSIONS "E" DOES NOT INCLUDE INTER-LEAD FLASH,OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .25mm (.0.10in) PER SIDE.

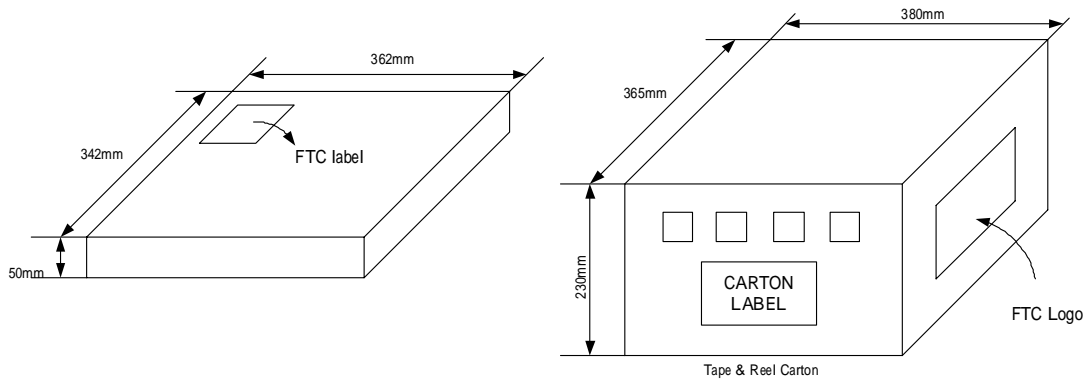
PACKING SPECIFICATIONS

BOX DIMENSION

TUBE INSIDE BOX AND CARTON



TAPE AND REEL INSIDE BOX AND CARTON



PACKING QUANTITY SPECIFICATIONS

50 EA/TUBE	2500 EA / REEL
50 TUBES / INSIDE BOX	4 INSIDE BOXES / CARTON
4 INSIDE BOXES / CARTON	

LABEL SPECIFICATIONS

TAPPING & REEL

Feeling Technology Corp. Product : FP130 Lot No : A3311C62 D/C : 4Xx-XXL Q'ty :	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 無鉛 Lead Free </div>
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CARTON

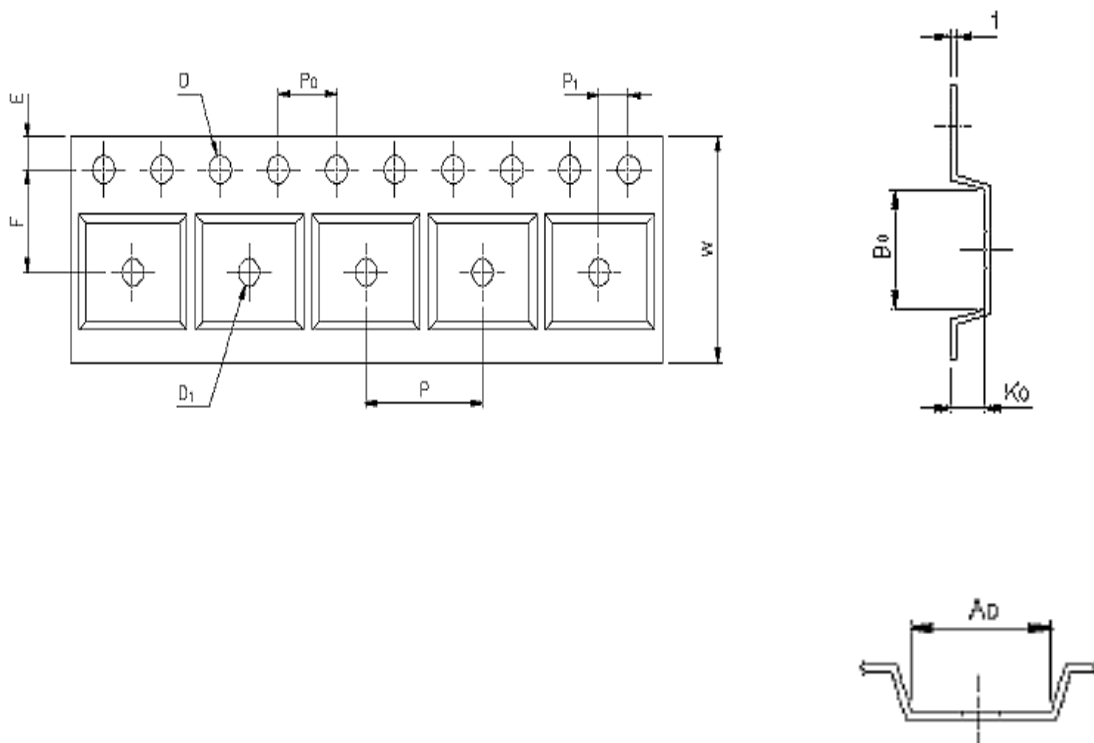
Feeling Technology Corp.	
Product Type:	FP130
Lot No:	A3311C62
Date Code:	4Xx-XXL
Package Type:	SOP-8L
Marking Type:	Laser
Total Q'ty:	10,000

無鉛 Lead Free

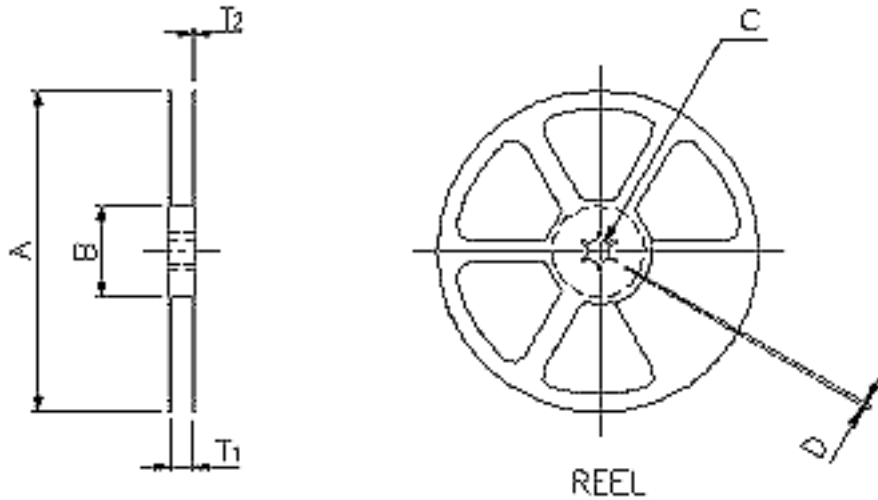
CARRIER TAPE DIMENSIONS

APPLICATION	W	P	E	F	D	D ₁
SOP8	12.0 ^{+0.3} _{-0.1}	8.0±0.1	1.75±0.1	5.5±0.1	1.55±0.1	1.5 ^{+0.25}

APPLICATION	P ₀	P ₁	A ₀	B ₀	K ₀	t
SOP8	4.0±0.1	2.0±0.1	6.4±0.1	5.20±0.1	2.1±0.10	0.30±0.013



REEL DIMENSIONS



APPLICATION	MATERIAL	A	B	C	D	T ₁	T ₂
SOP8	PLASTIC REEL (WHILE)	330±0.1	62±1.5	12.75+0.15	2+0.6	12.4+0.2	2.0+0.2

SGS REORT



Test Report

FEELING TECHNOLOGY CORP.
2F, NO.287, SEC.2, KUANG FU RD., SHIN-CHU
CITY, TAIWAN, R.O.C.

Report No : CE/2003/81704
Date : 2003/08/28
Page : 1 of 1

The following merchandise was(were) submitted and identified by the client as :


Type of Product : POWER IC (FP130D)
Style/Item No : SOP-8
Sample Received : 2003/08/25.
Testing Date : 2003/08/25 TO 2003/08/28

Test Result

PART NAME NO.1 : IC(MIX ALL PARTS)

Test Item(s):	Unit	Method	MDL	Result				Spec.
				NO.1				
Lead (Pb)	ppm	ICP-AES After As per US EPA3050B or Acid digestion.	2	16.3				

- NOTE: (1) N.D. = Not detected.(<MDL)
(2) ppm = mg/kg
(3) MDL= Method Detection Limit
(4) "--" = Not Applicable
(5) *=Results shown are of the adjusted analytical results.


Anren Lee, M.S., Supervisor
Signed for and on behalf of
SGS TAIWAN LTD.

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