

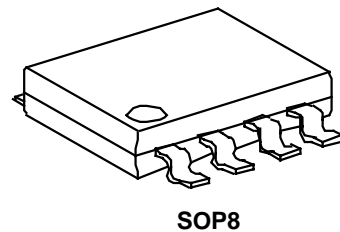
SWITCHING BUCK REGULATOR

GENERAL DESCRIPTION

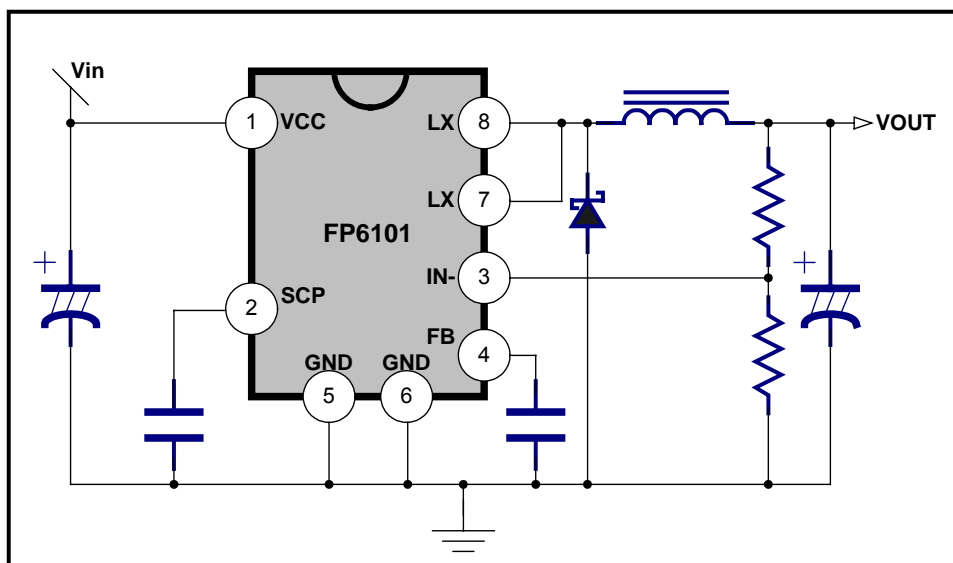
The **FP6101** is a buck IC of switching regulator for wide operating voltage application fields. The **FP6101** includes a high current P-MOSFET, high precision reference (0.5V) for comparing output voltage with a feedback amplifier, an internal dead-time controller and oscillator for controlling the maximum duty cycle and PWM frequency, and has power-on programmable soft start time and short circuit PMOS turn-off and auto re-start protection functions.

FEATURES

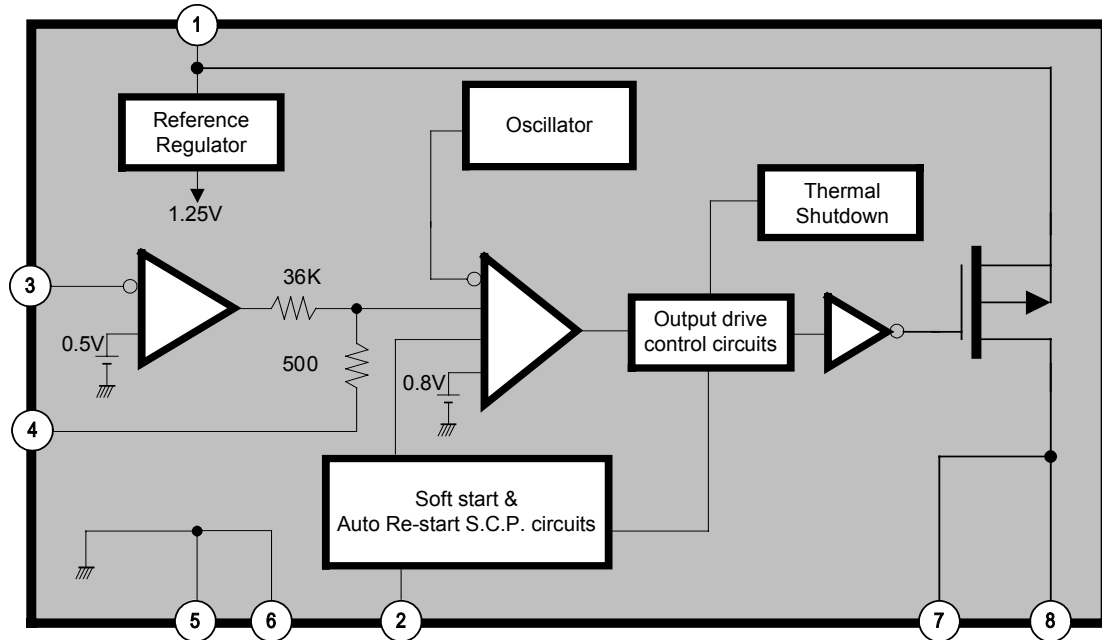
- Precision feedback reference voltage: 0.5V (2%)
- Wide supply voltage operating range: 3.6 to 20V
- Low current consumption: 3mA
- Internal fixed oscillator frequency: Typ. 340KHz
- Programmable Soft-Start function (SS)
- Short Circuit Shutdown and Auto Re-start function(ARSCP)
- Built-in P-MOSFET for 2A loading capability
- Package: SOP8



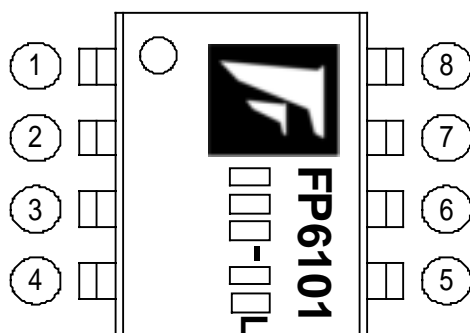
TYPICAL APPLICATION



FUNCTIONAL BLOCK DIAGRAM



MARK VIEW



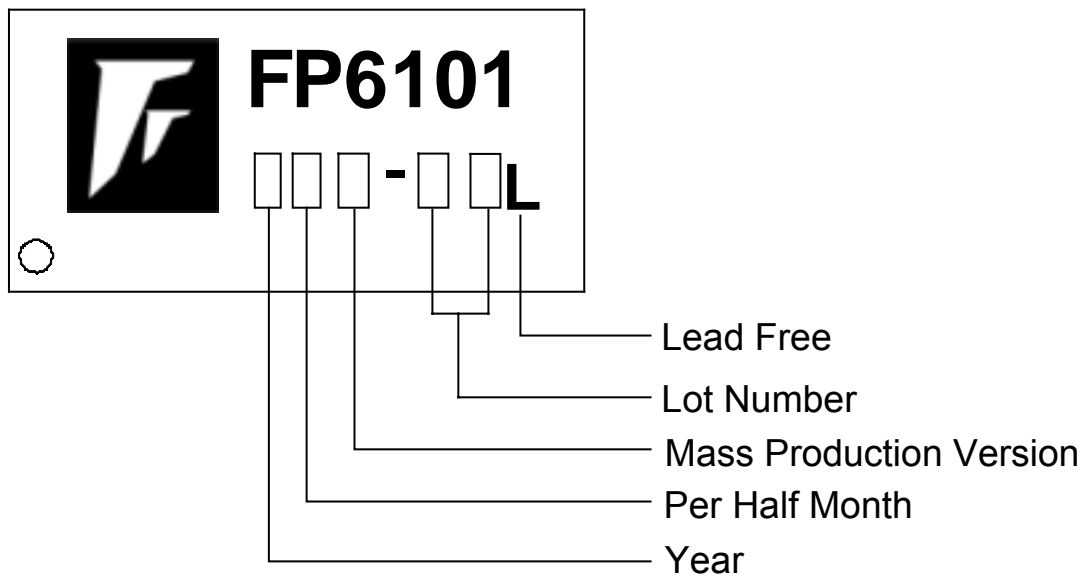
PIN DESCRIPTION

Name	No.	I/O	Description
VCC	1	P	IC Power Supply (PMOS Source)
SS/SCP	2	I	Connecting with a Soft-start & ARSCP timing capacitor
IN ⁻	3	I	Error Amplifier Inverting Input
FB	4	O	Error Amplifier Compensation Output
GND	5	P	IC Ground
	6		
LX	7	O	PMOS High Current Output
	8		

ORDER INFORMATION

Part Number	Operating Temperature	Package	Description
FP6101D-LF	-25°C ~ +85°C	SOP8	Tube
FP6101DR-LF	-25°C ~ +85°C	SOP8	Tape & Reel

IC DATE CODE DISTINGUISH



FOR EXAMPLE:

January A (Front Half Month), B (Last Half Month)
 February C, D
 March E, F -----And so on

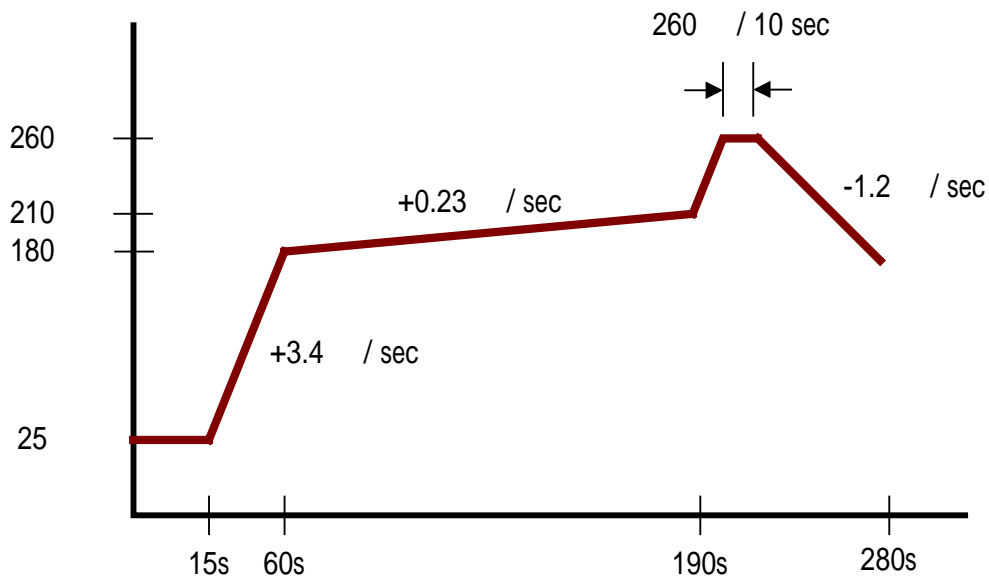
The printing ink of the lot number is a last two numbers of one wafer lot:

For Example:

A3311C62
 └──────────▶ Lot Number

ABSOLUTE MAXIMUM RATINGS

Power supply voltage -----	+20V
Output source current -----	+3A
Error amplifier inverting input -----	-0.3V~+1.2V
Allowable dissipation	
SOP8 Ta +25 -----	650mW
Thermal Resistance Junction to Ambient -----	175 /W
Operating temperature-----	-25 +85
Storage temperature-----	-55 +125
SOP8 Lead Temperature (soldering, 10 sec) -----	+260



FP6101 IR Re-flow Soldering Curve

DC ELECTRICAL CHARACTERISTICS

Electrical characteristics over recommended operating free-air temperature range, $V_{CC}=6V$, (unless otherwise noted)

Reference

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output voltage	V_{REF}	IN ⁻ connected to FB	0.490	0.5	0.510	V
Input regulation	V_{REF}	$V_{CC} = 3.6 V$ to $20 V$	-	2	12.5	mV
Output voltage change with temperature	V_{REF}/V_{REF}	$T_A = -25$ to 25	-	1	2	%
		$T_A = 25$ to 85	-	1	2	

Soft Start section (S.S.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
S.S. Source current	I_{SS}	$V_{SS} = 0V$	-7	-12	-17	μA
Soft start threshold voltage	V_{SST}	--	0.9	1.0	1.1	V

Short Circuit Protection section (S.C.P.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
S.C.P. source current	I_{SCP}	$V_{SCP} = 0V$	-7	-12	-17	μA
SCP re-start / hold time	T_{RS}/T_{HOLD}	$V_{FB} = 0V$	-	1/20	-	-
S.C.P. threshold voltage	V_{SCP}	$V_{FB} > 450mV$	1.0	1.15	1.2	V
	V_{SB}	$V_{FB} < 450mV$	-	0.1	0.15	

Oscillator section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Oscillation frequency	f	--	-	340	-	KHz
Frequency change with voltage	$\Delta f / \Delta V$	$V_{CC} = 3.6V$ to $20V$	-	5	-	%
Frequency change with temperature	$\Delta f / \Delta T$	$T_a = -25$ to $+85$	-	5	-	%

Thermal Shutdown section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Thermal shutdown temperature	--	--	-	145	-	

DC ELECTRICAL CHARACTERISTICS (Cont.)

Error Amplifier section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input bias current	I_B	--	-1.0	-0.2	1.0	μA
Voltage Gain	A_V	--	-	100	-	V/V
Frequency bandwidth	BW	$A_V=0$ dB	-	6	-	MHz
Output voltage Swing	Positive	$V_{IN.}=0.3V$	0.78	0.87	-	V
	Negative	$V_{IN.}=0.7V$	-	0.05	0.2	
Output source current	I_{SOURCE}	$V_{FB}=500mV$	-30	-45	-	μA
Output sink current	I_{SINK}		30	45	-	μA

Idle Period Adjustment section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Maximum duty cycle	T_{DUTY}	$V_{IN.}=0.2V$	-	90	-	%

Total device section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Average supply current	$I_{STANDBY}$	--	-	3	5	mA

Output section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
PMOS D-S voltage	V_{DSS}	$V_{FB}=0.1V$	-	-20	-	V
PMOS source current	I_D	--	-	-2	-	A
PMOS On resistance	$R_{DS(ON)}$	$V_{CC}=5.0V, V_{IN.}=0V$	-	70	150	m
		$V_{CC}=10V, V_{IN.}=0V$	-	42	90	
Output leakage current	I_L	--	-	5	-	μA

TYPICAL CHATACTERISTICS

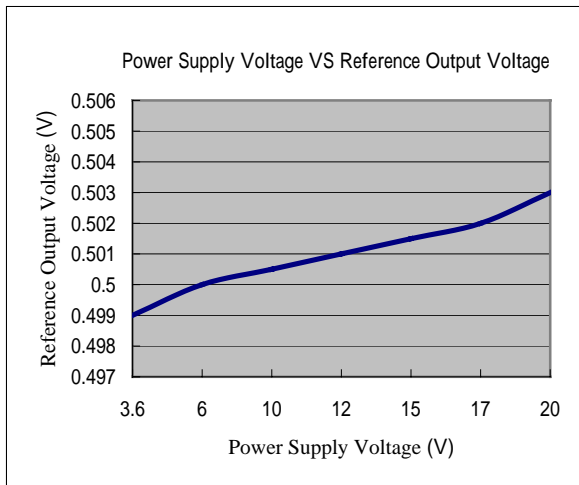


Figure 1

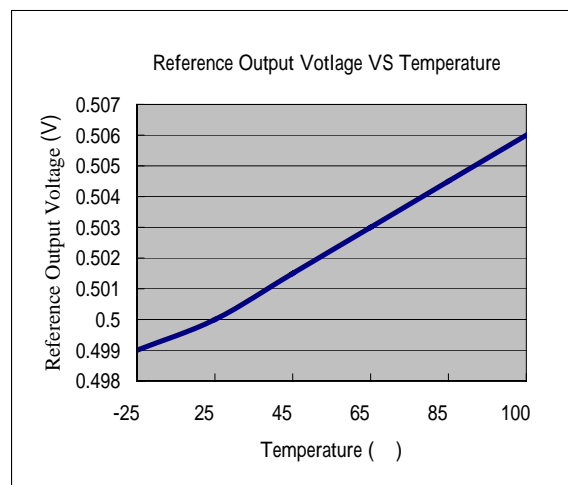


Figure 2

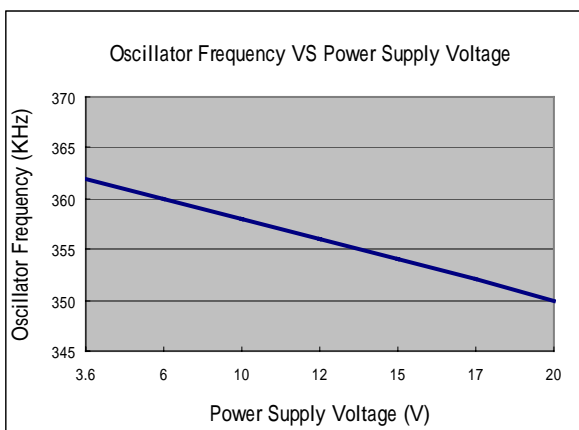


Figure 3

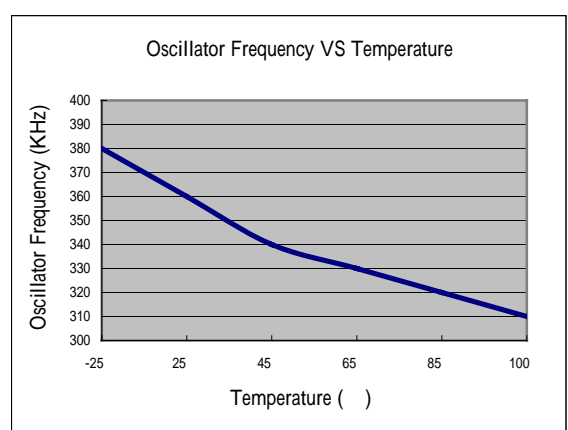


Figure 4

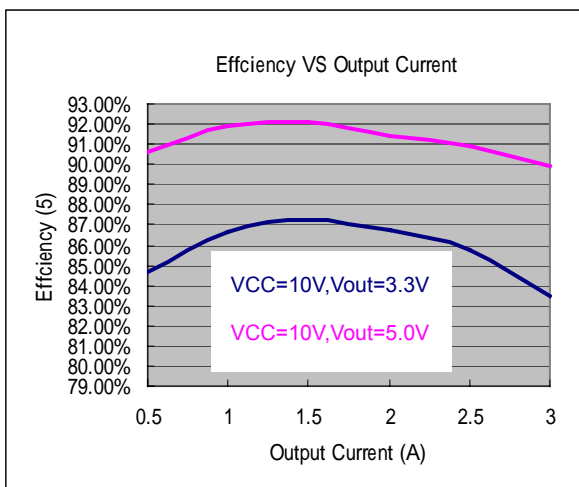


Figure 5

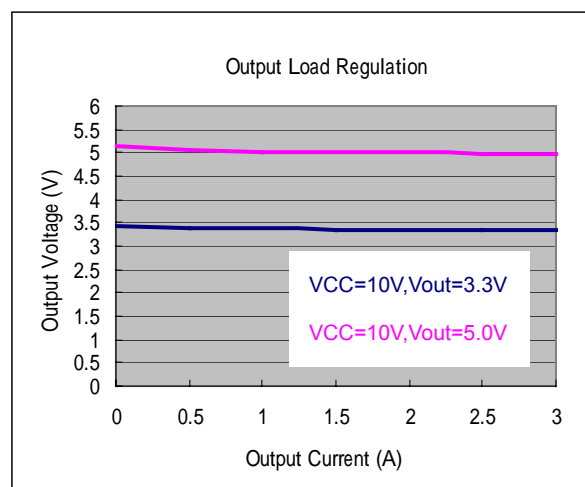
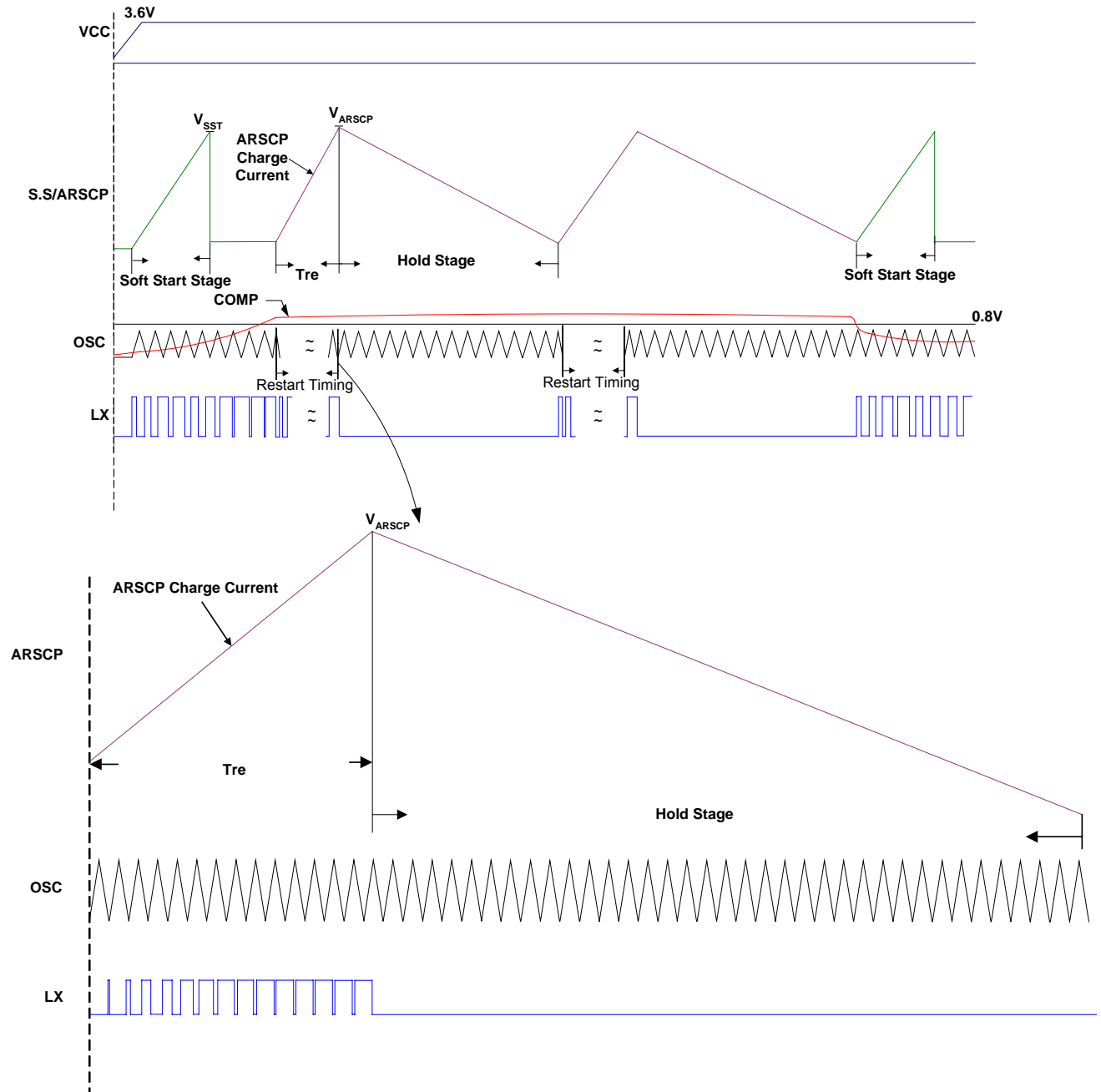
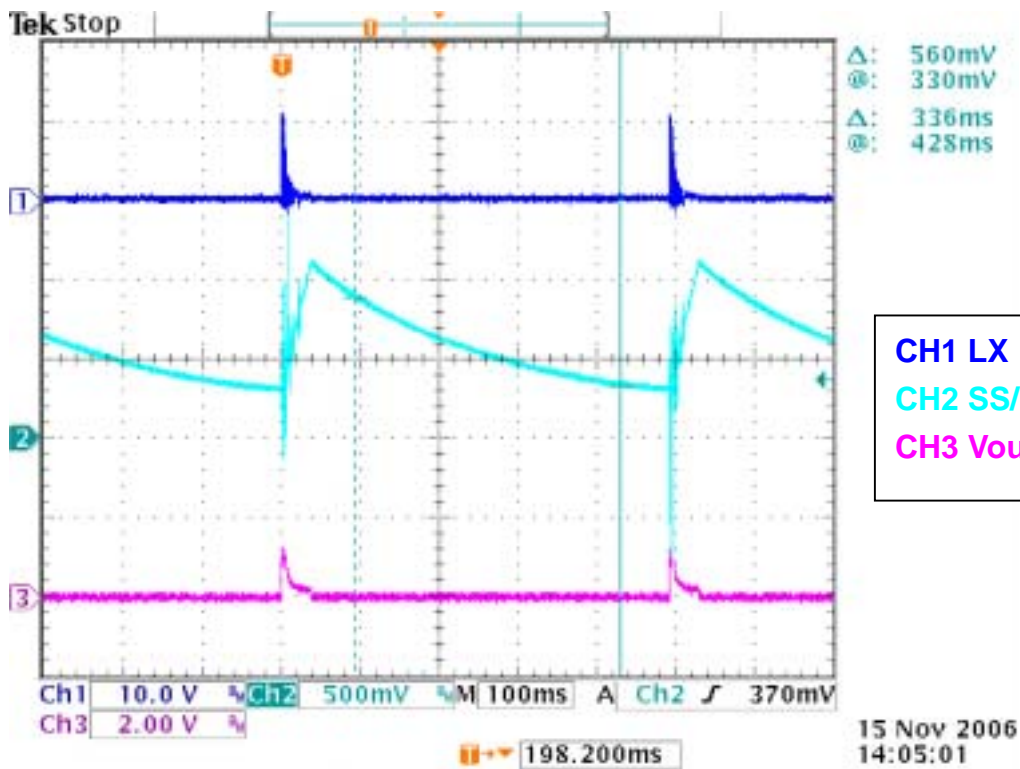
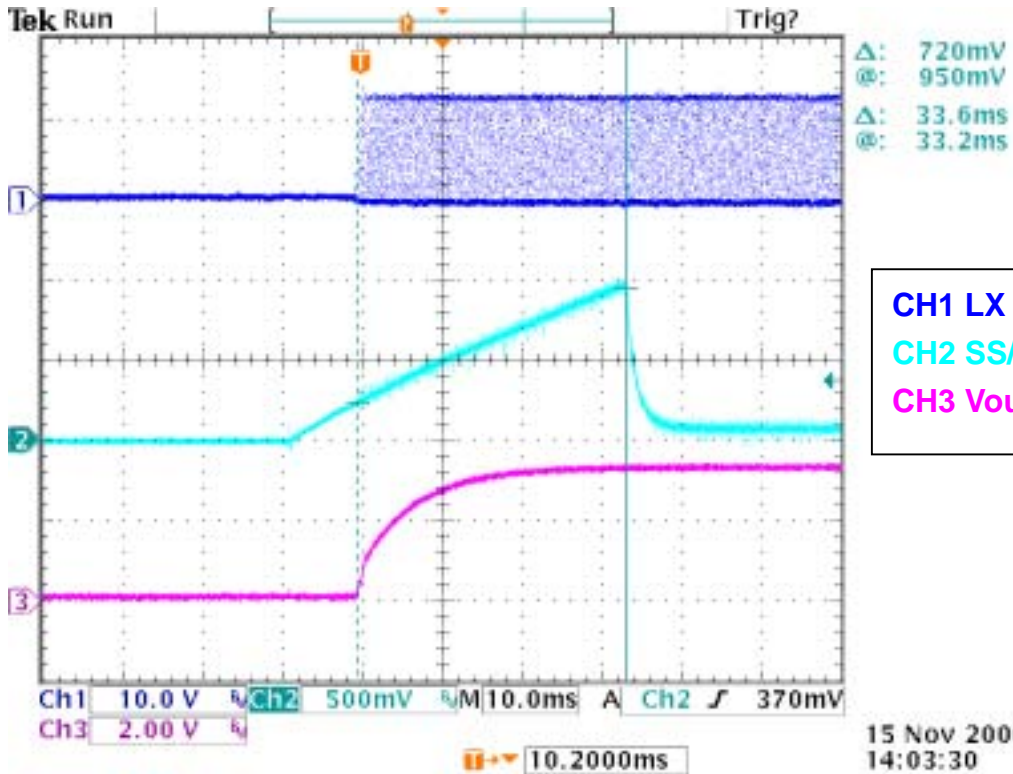


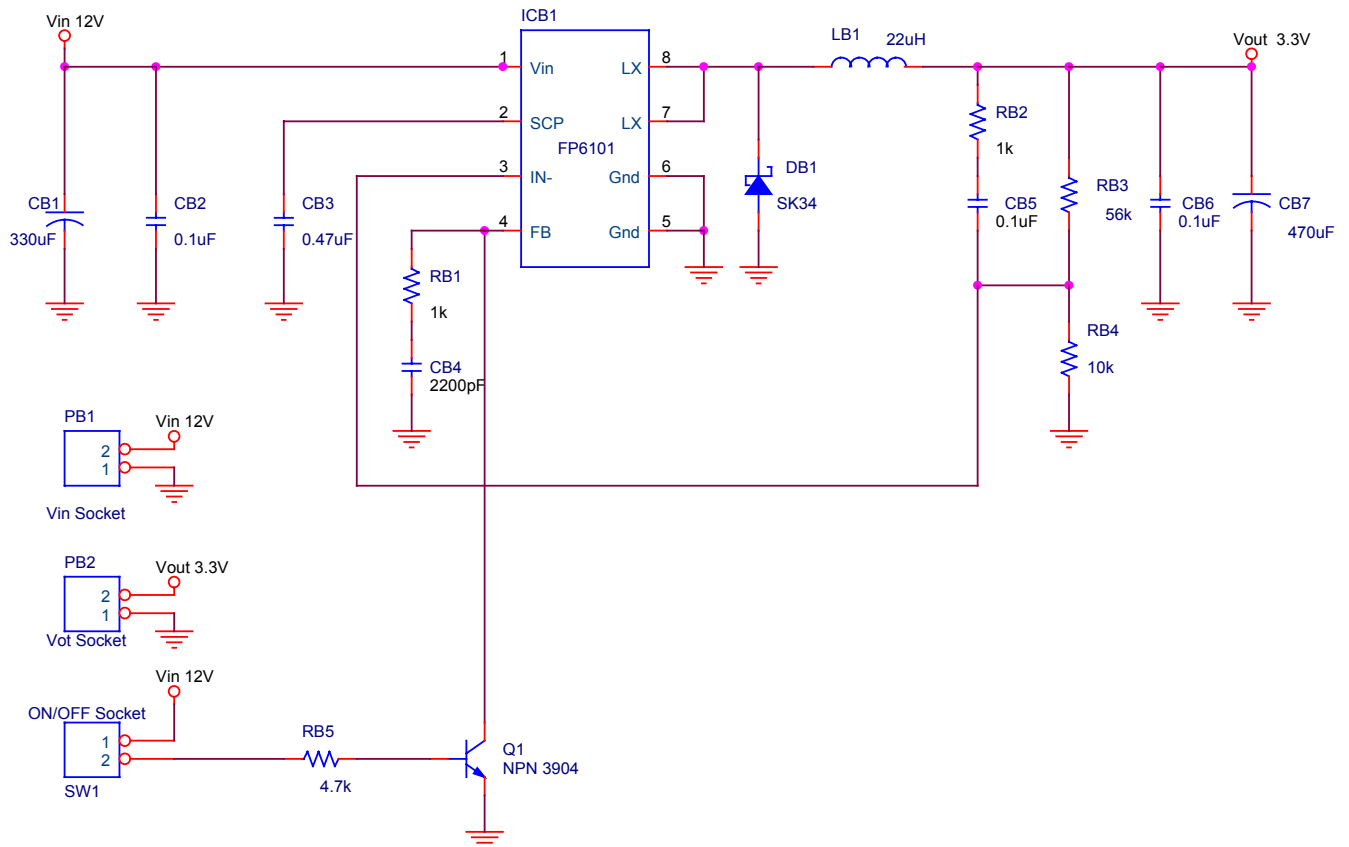
Figure 6

TIMING WAVEFORM





APPLICATION NOTE



FP6101 Basic DC-DC Regulator Circuits

For example:

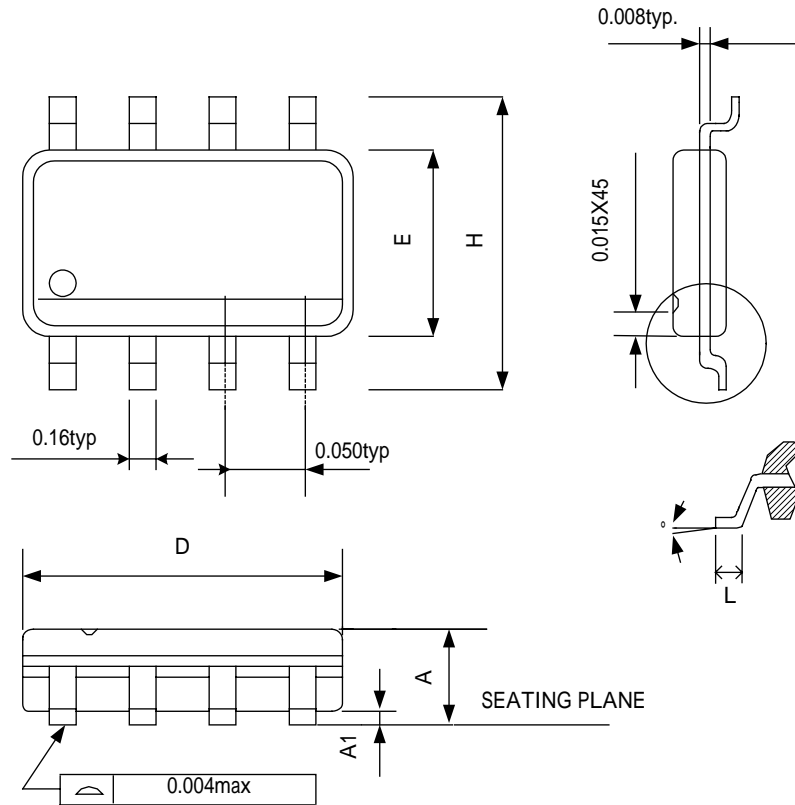
The V_{IN} is 12V power supply and the V_{OUT} is designed for 3.3V / 2A solution.

The output voltage formula is:

$V_{ref} = IN$ Connect to FB

$$V_{OUT} = \left(1 + \frac{R1}{R2}\right) * V_{ref} = \left(1 + \frac{56K\Omega}{10K\Omega}\right) * 0.5V = 3.30V$$

PACKAGE OUTLINE SOP8



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

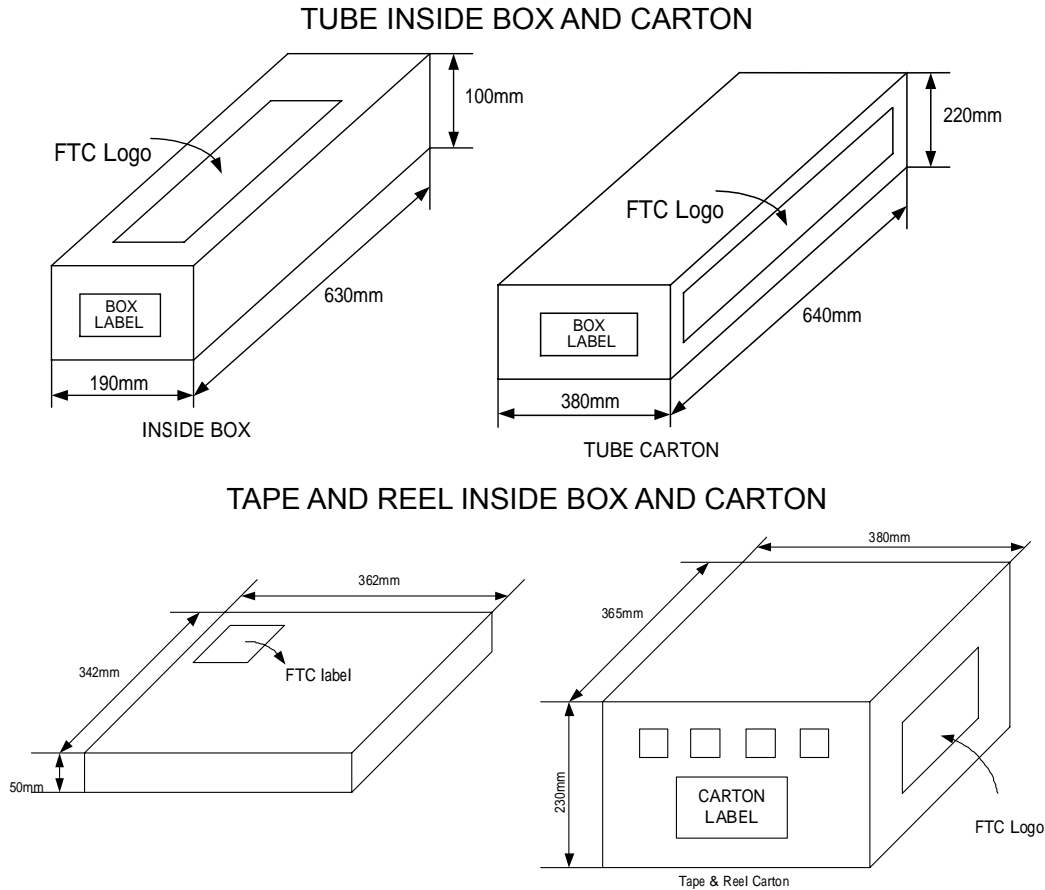
UNIT:INCH

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 (.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



PACKING QUANTITY SPECIFICATIONS

FP6101D-LF SOP8	FP6101DR-LF SOP8
100 EA/TUBE	2500 EA / REEL
100 TUBES / INSIDE BOX	1 REEL / INSIDE BOX
4 INSIDE BOXES / CARTON	4 INSIDE BOXES / CARTON

LABEL SPECIFICATIONS

Tapping & Reel

Feeling Technology Corp.	
Product	FP6101DR-LF
Lot No	A3311C62
D/C	6Xx-62L
Q'ty	2,500
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 無鉛 Lead Free </div>	

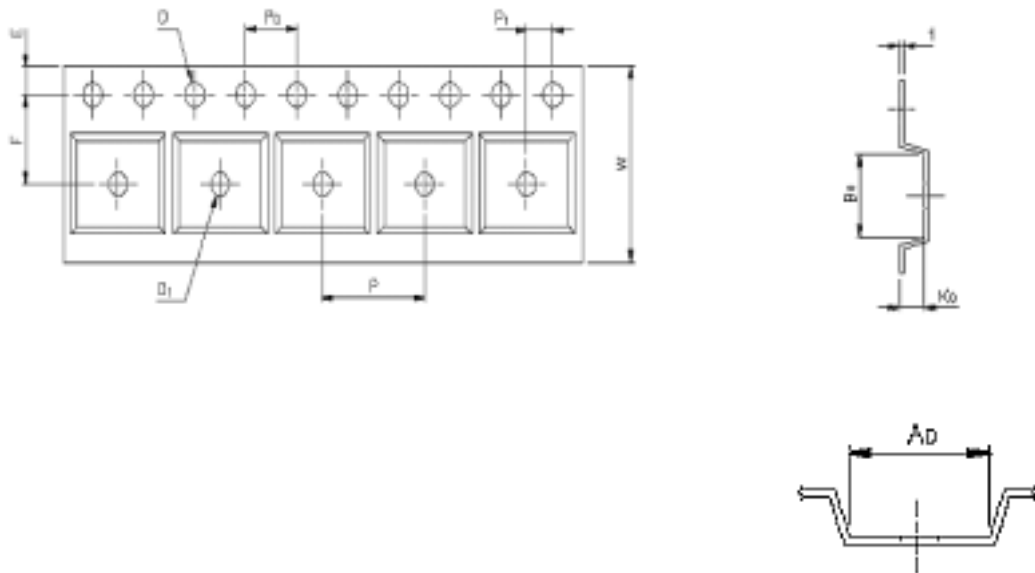
Carton

Feeling Technology Corp.	
Product Type:	FP6101DR-LF
Lot No:	A3311C62
Date Code:	6Xx-62L
Package Type:	SOP-8L
Marking Type:	Laser
Total Q'ty:	10,000
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 無鉛 Lead Free </div>	

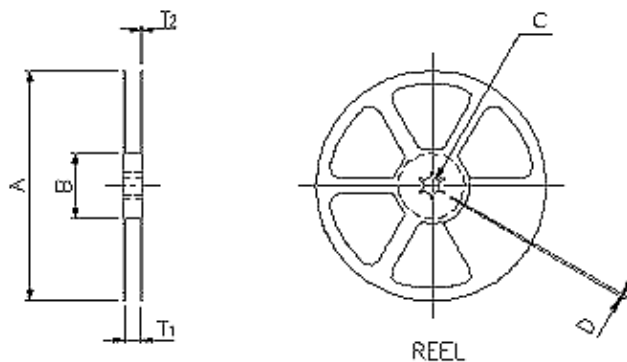
SOP8 CARRIER TAPE DIMENSIONS

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 _D	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	330±0.1	62±1.5	12.75±0.15	2±0.6	12.4±0.2	2.0±0.2