GENERAL DESCRIPTION

The SB6540 is specially designed as a low frequency low power Electroluminescent Lamp Driver IC. Built-in RC OSC, transistors and only requires 2~3 external components. It is specially designed for products of EMI concern.

FEATURE

* BIPLOR TECHNOLOGY
* OPERATING VOLTAGE : 2.2V ~ 5.0V DC
* TOTAL SUPPLY CURRENT : 20mA (at Vdd = 3 V)
* LOW FREQUENCY 200 Hz
* Built-in RC OSC & TRANSISTORS

APPLICATIONS

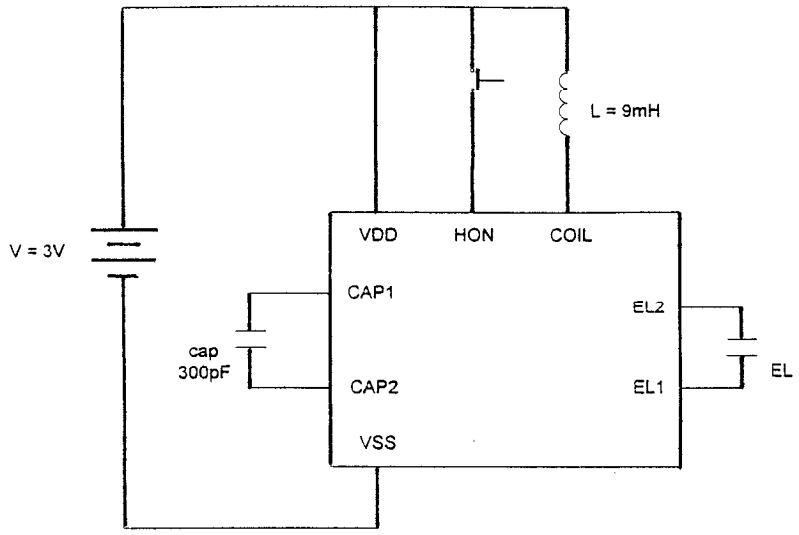
* CELLULAR PHONE LCD BACKLIGHT
* CORDLESS PHONE (DECT, 900MHz, 46/49MHz ..) LCD BACKLIGHT
* WATCH BACKLIGHT
* PAGER BACKLIGHT
* SMALL SIZE DISPLAY DATABACK BACKLIGHT
* OTHER PORTABLE PRODUCTS WITH SMALL SIZE LCD BACKLIGHT

SPECIFICATION

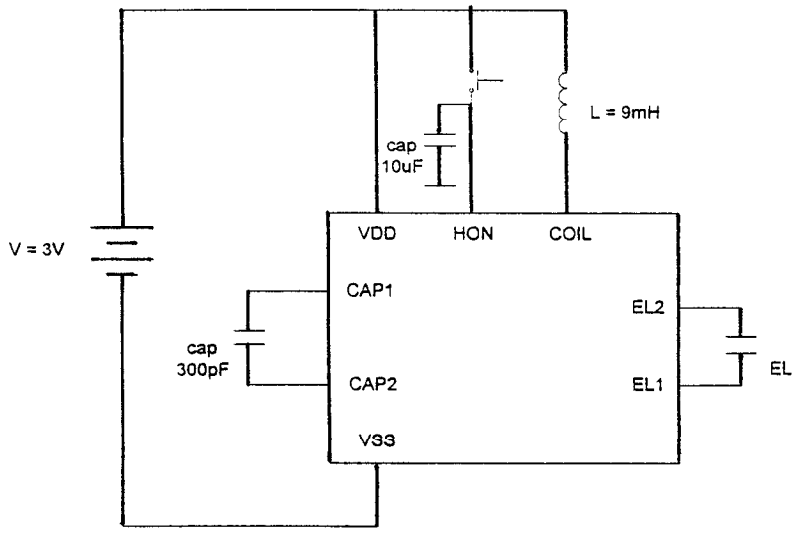
($T=25^{\circ}C$, $V_{dd}=3.0V$, Lamp Capacitacnce=3000pF, Coil=12mH(R=24Ω), $C_{osc}=282pF$

PARAMETER	MIN	MAX	UNIT	CONDITIONS
Supply Voltage	2.2	5.0	V	
Total Supply Current		20	mA	V_{dd}=3.0V; H_{ON}=3.0V
Quiescent Supply Current		200	nA	V_{dd}=3.0V; H_{ON}=0V
H_{ON} Voltage On	V_{dd}-0.5	V_{dd}	V	
H_{ON} Current On		60	μA	V_{dd}=3.0V
H_{ON} Voltage Off		V_{dd}-2	V	V_{dd}=3.0V
Inductor Drive Peak Current		60	mA	
Lamp Output				
Differential Voltage	110		V_{PP}	V_{dd}=3.0V
Frequency	200	400	Hz	V_{dd}=3.0V

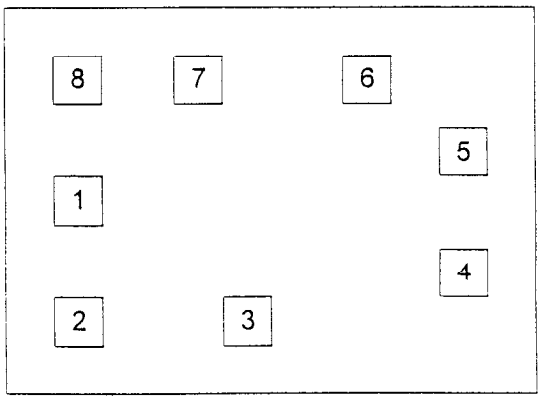
APPLICATION CIRCUIT – HOLD RELEASE



APPLICATION CIRCUIT – HOLD DELAY



BOUNDING DIAGRAM



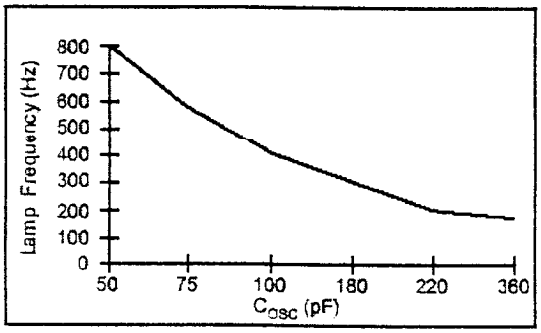
Pad Allocation

Pad No.	Pad name	X (um)	Y(um)
1	HON	-787.5	128.5
2	VSS	-782.5	-668.5
3	COIL	-301.5	-668.5
4	EL2	793.5	98.5
5	EL1	793.5	311.5
6	VDD	-84.5	671.5
7	CAP1	-508.5	670.5
8	CAP2	793.5	96.5

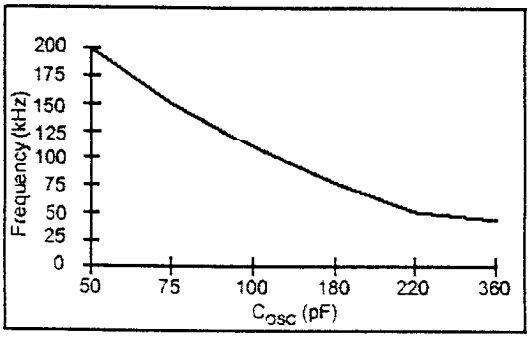
Note:

1. Dimensions are in Microns
2. Bounding pads are 125 X 125 typ
3. Outside dimensions are maximum, including acribe area
4. Pad centre coordinates are relative to die centre
5. Die size 1970 X 1970
6. Substrate must be connected to Vss
7. Die thickness is 450 microns

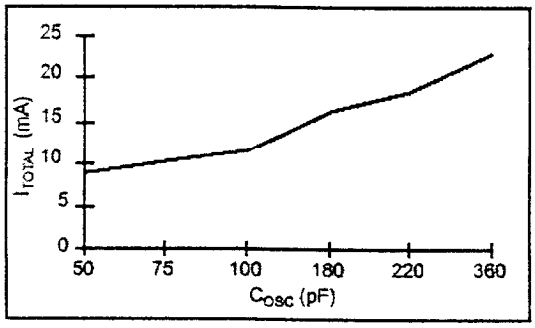
The following performance curves are intended to give the designer a relative scale from which to optimize specific applications. Absolute measurements may vary depending upon the brand of components chosen.



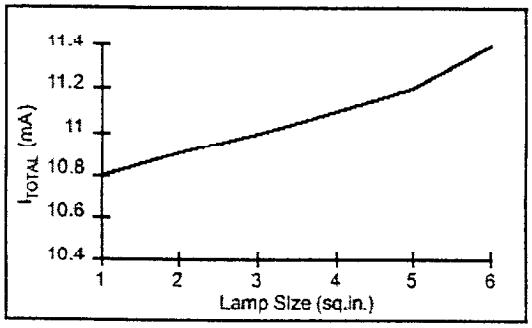
Lamp Frequency vs C_{OSC}
V_{DD}= 3.0V; Coil= 9mH, 35Ω; Lamp=1 sq. in.



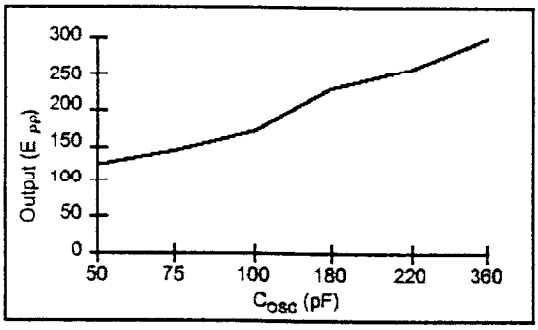
Oscillator Frequency vs C_{OSC}
V_{DD}= 3.0V; Coil= 9mH, 35Ω; Lamp=1 sq. in.



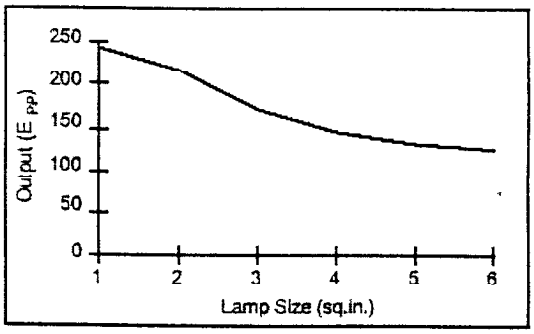
I_{TOTAL} vs C_{OSC}
V_{DD}= 3.0V; Coil= 9mH, 35Ω; Lamp=1 sq. in.



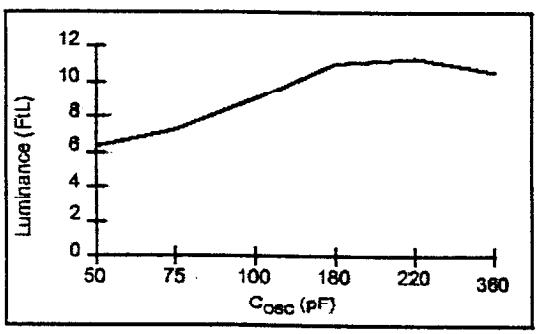
I_{TOTAL} vs Lamp Size
V_{DD}= 3.0V; Coil= 9mH, 35Ω; C_{OSC} = 180pF



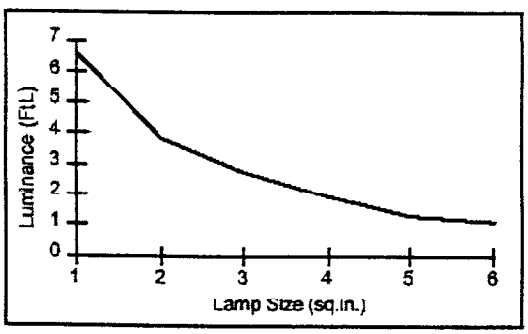
Output Voltage vs C_{OSC}
V_{DD}= 3.0V; Coil= 9mH, 35Ω; Lamp=1 sq. in.



Output Voltage vs Lamp Size.
V_{DD}= 3.0V; Coil= 9mH, 35Ω; C_{OSC}= 180pF

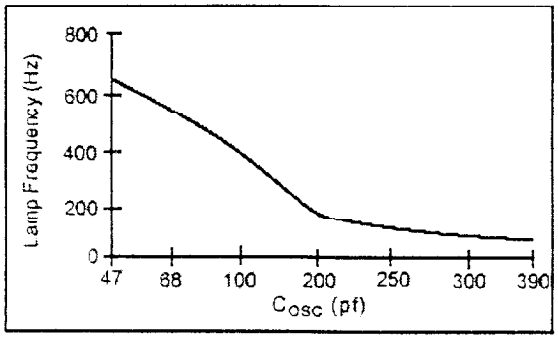


Luminance vs C_{OSC}
V_{DD}= 3.0V; Coil= 9mH, 35Ω; Lamp=1 sq. in.

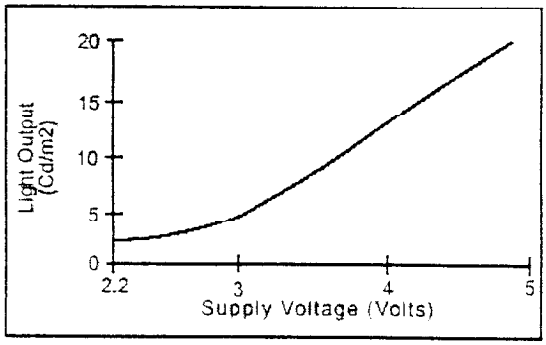


Luminance vs Lamp Size.
V_{DD}= 3.0V; Coil= 9mH, 35Ω; C_{OSC}= 180pF

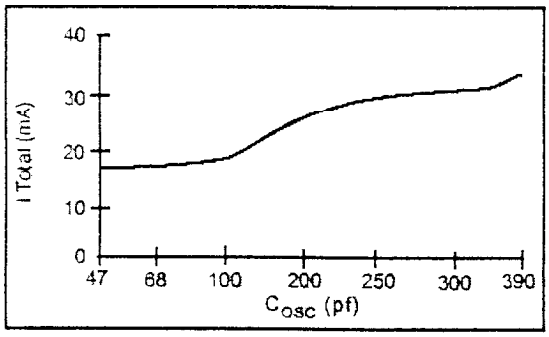
The following performance curves are intended to give the designer a relative scale from which to optimize specific applications. Absolute measurements may vary depending upon the brand of components chosen.



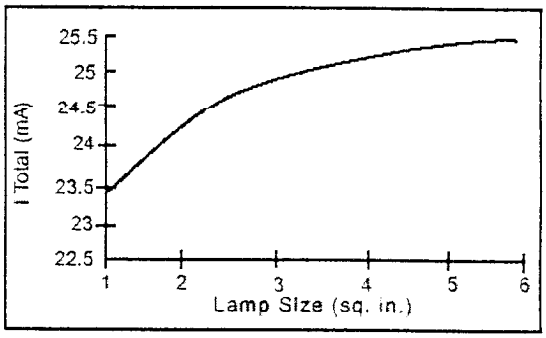
Lamp Frequency vs. C_{OSC}
V_{DD}= 3.0V; Coil= 5mH, 18Ω; Load=10nF



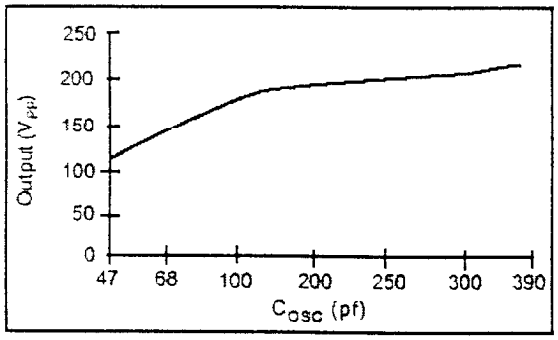
Luminance vs. V_{DD}=Vcoil
V_{DD}=3.0V; Coil=5mH, 18Ω; Load=10nF



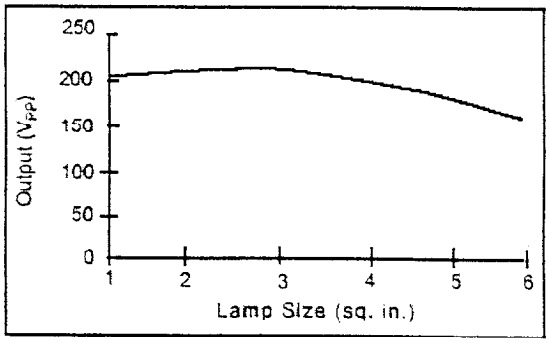
I_{TOTAL} vs. C_{osc}
V_{DD}= 3.0V; Coil= 5mH, 18Ω; Load=10nF



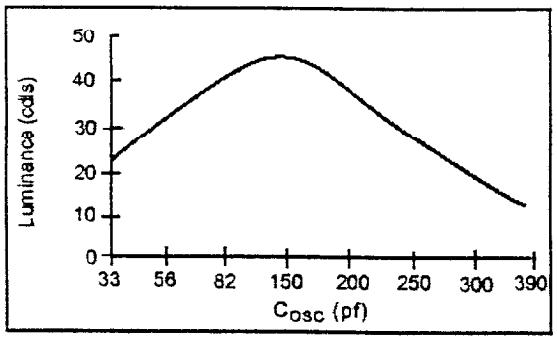
I_{TOTAL} vs. Lamp Size
V_{DD}= 3.0V; Coil= 5mH, 18Ω; C_{OSC}=100pF



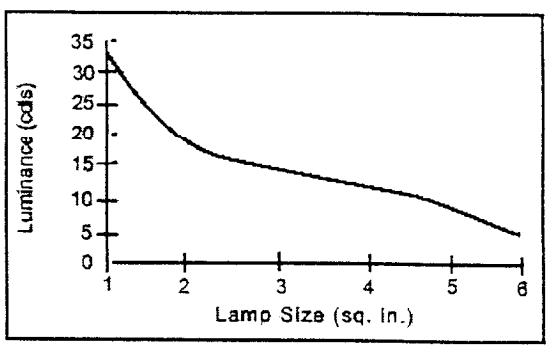
Output Voltage vs. C_{OSC}
V_{DD}= 3.0V; Coil= 5mH, 18Ω; Load=10nF



Output Voltage vs. Lamp Size.
V_{DD}= 3.0V; Coil= 5mH, 18Ω; C_{OSC}=100pF



Luminance vs. C_{OSC}
V_{DD}= 3.0V; Coil= 5mH, 18Ω; Load=10nF



Luminance vs. Lamp Size.
V_{DD}= 3.0V; Coil= 5mH, 18Ω; C_{OSC}=100pF

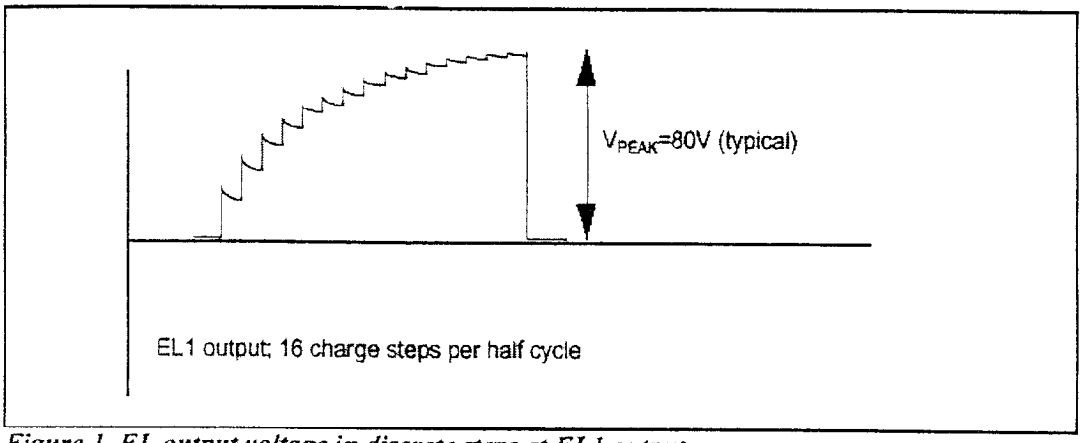


Figure 1. EL output voltage in discrete steps at EL1 output

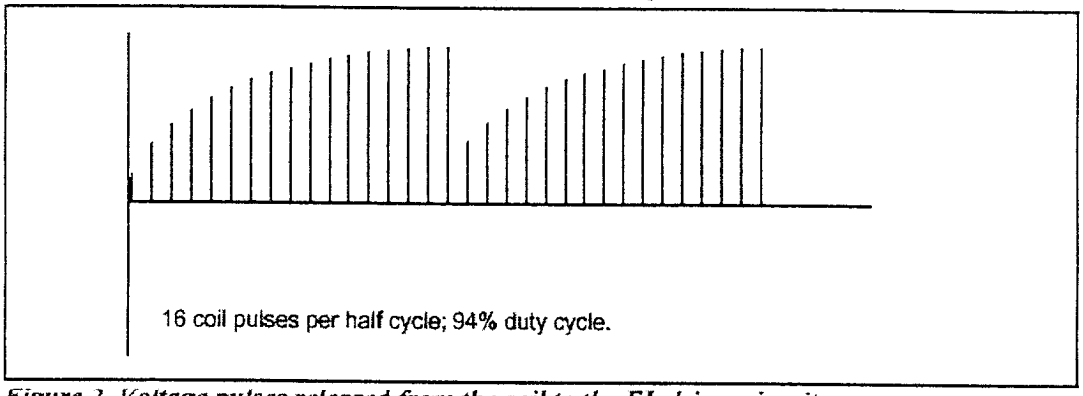


Figure 2. Voltage pulses released from the coil to the EL driver circuitry

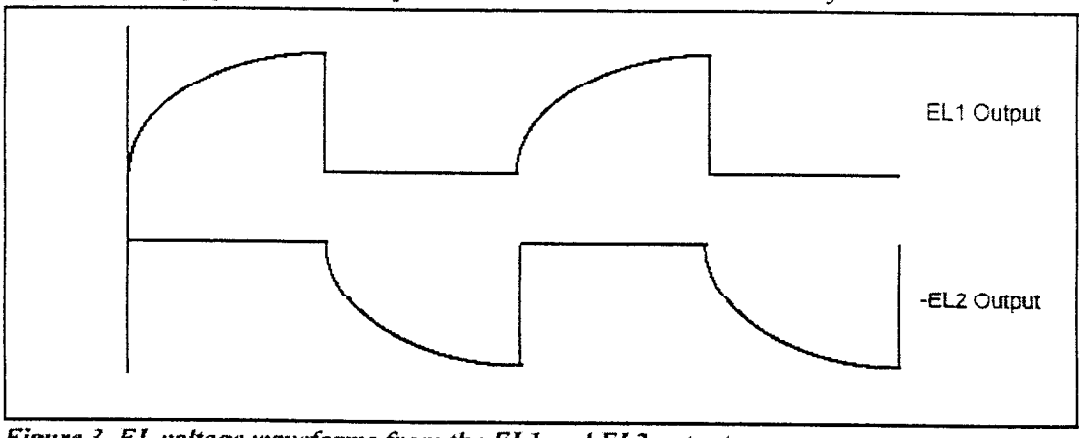


Figure 3. EL voltage waveforms from the EL1 and EL2 outputs

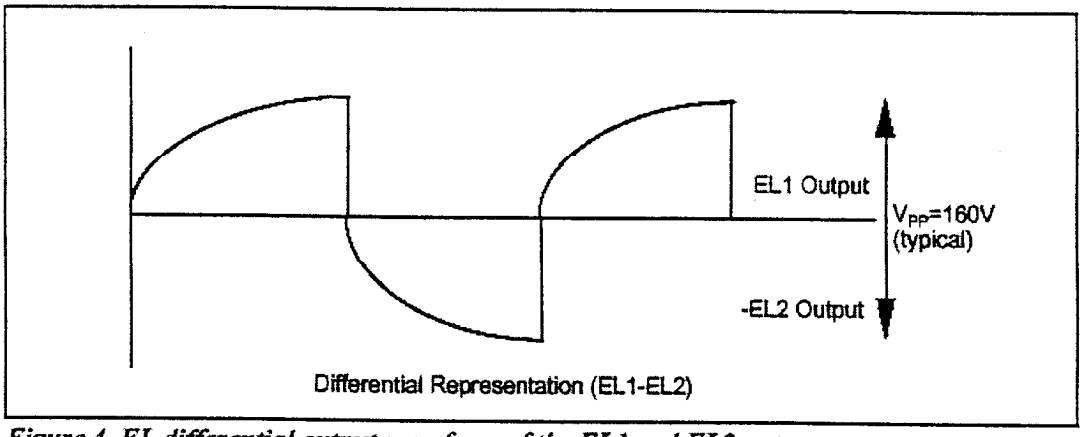


Figure 4. EL differential output waveform of the EL1 and EL2 outputs

Experimental results of SB6540C against various sizes of EL elements

1. Testing conditions :
   EL element size : 1″ X 1.125″ (1.125″ square)
   Supply voltage : 3V
   Capacitance : 282pF
   1.1 Inductance : 9mH, 37Ω
   Output Voltage : 210Vp-p
   Output Frequency : 185Hz
   1.2 Inductance : 12mH, 30W
   Output Voltage : 220Vp-p
   Output Frequency : 185Hz

2. Testing conditions :
   EL element size : 2.125″ X 1.125″ (2.4″ square)
   Supply voltage : 3V
   Capacitance : 282pF
   2.1 Inductance : 9mH, 37Ω
   Output Voltage : 170Vp-p
   Output Frequency : 185Hz
   2.2 Inductance : 12mH, 30W
   Output Voltage : 176Vp-p
   Output Frequency : 185Hz

3. Testing conditions :
   EL element size : 2.75″ X 1.125″ (3″ square)
   Supply voltage : 3V
   Capacitance : 282pF
   3.1 Inductance : 9mH, 37Ω
   Output Voltage : 140Vp-p
   Output Frequency : 185Hz
   3.2 Inductance : 12mH, 30W
   Output Voltage : 156Vp-p
   Output Frequency : 185Hz

4. Testing conditions :
   EL element size : 3.625″ X 1.125″ (4.078″ square)
   Supply voltage : 3V
   Capacitance : 282pF
   4.1 Inductance : 9mH, 37Ω
   Output Voltage : 140Vp-p
   Output Frequency : 185Hz
   4.2 Inductance : 12mH, 30W
   Output Voltage : 140Vp-p
   Output Frequency : 185Hz

5. Testing conditions :
   EL element size : 6.125″ X 1.125″ (6.89″ square)
   Supply voltage : 3V
   Capacitance : 282pF
   5.1 Inductance : 9mH, 37Ω
   Output Voltage : 112Vp-p
   Output Frequency : 185Hz
   5.2 Inductance : 12mH, 30W
   Output Voltage : 112Vp-p
   Output Frequency : 185Hz

TITLE: EXPERIMENTAL DATA of TESTING SB6540C with INDUCTOR **9mH 35ohms**

	C_{osc}	I_L	V_{PP}	Freq
1.	39pF	16.1mA	65V	1200Hz
2.	100pF	11.8mA	90V	555Hz
3.	150pF	12.9mA	110V	370Hz
4.	300pF	16.8mA	140V	212Hz
5.	560pF	21.0mA	140V	119Hz

TITLE: EXPERIMENTAL DATA of TESTING SB6540C with INDUCTOR **12mH 28ohms**

	C_{osc}	I_L	V_{PP}	Freq
1.	47pF	20.1mA	61V	961Hz
2.	94pF	16.4mA	80V	555Hz
3.	141pF	13.9mA	84V	392Hz
4.	188pF	13.6mA	96V	303Hz
5.	235pF	14.5mA	100V	238Hz
6.	282pF	15.2mA	108V	217Hz
7.	329pF	16.7mA	116V	178Hz
8.	376pF	17.7mA	120V	156Hz

TITLE: EXPERIMENTAL DATA of TESTING SB6540C with INDUCTOR **20mH 65ohms**

	C_{osc}	I_L	V_{PP}	Freq
1.	235pF	10.5mA	88V	250Hz
2.	282pF	10.5mA	94V	200Hz
3.	329pF	11.3mA	104V	172Hz
4.	376pF	12.0mA	108V	156Hz