

### POWER MANAGEMENT

#### Description

The SC606 is a very high efficiency charge pump white/color LED driver from the mAhXLife™ family of products. It is optimized for Li-Ion battery applications. The LED current is regulated to a value configured by the user through an I<sup>2</sup>C compatible serial interface.

LED outputs are current-matched for consistent LED brightness. Up to 6 LEDs are controlled in three zones for brightness control in multiple displays. The 6 LED outputs are divided into 3 pairs of LEDs. Each pair has current that is programmable independent of the other pairs. Any combination of LEDs may be turned on using the serial interface. The SC606 also has a float detect feature that disables any current driver during normal operation when an open-load condition is detected.

Patented low noise switching circuitry and constant output current allow the use of extremely small input and output capacitors.

#### Features

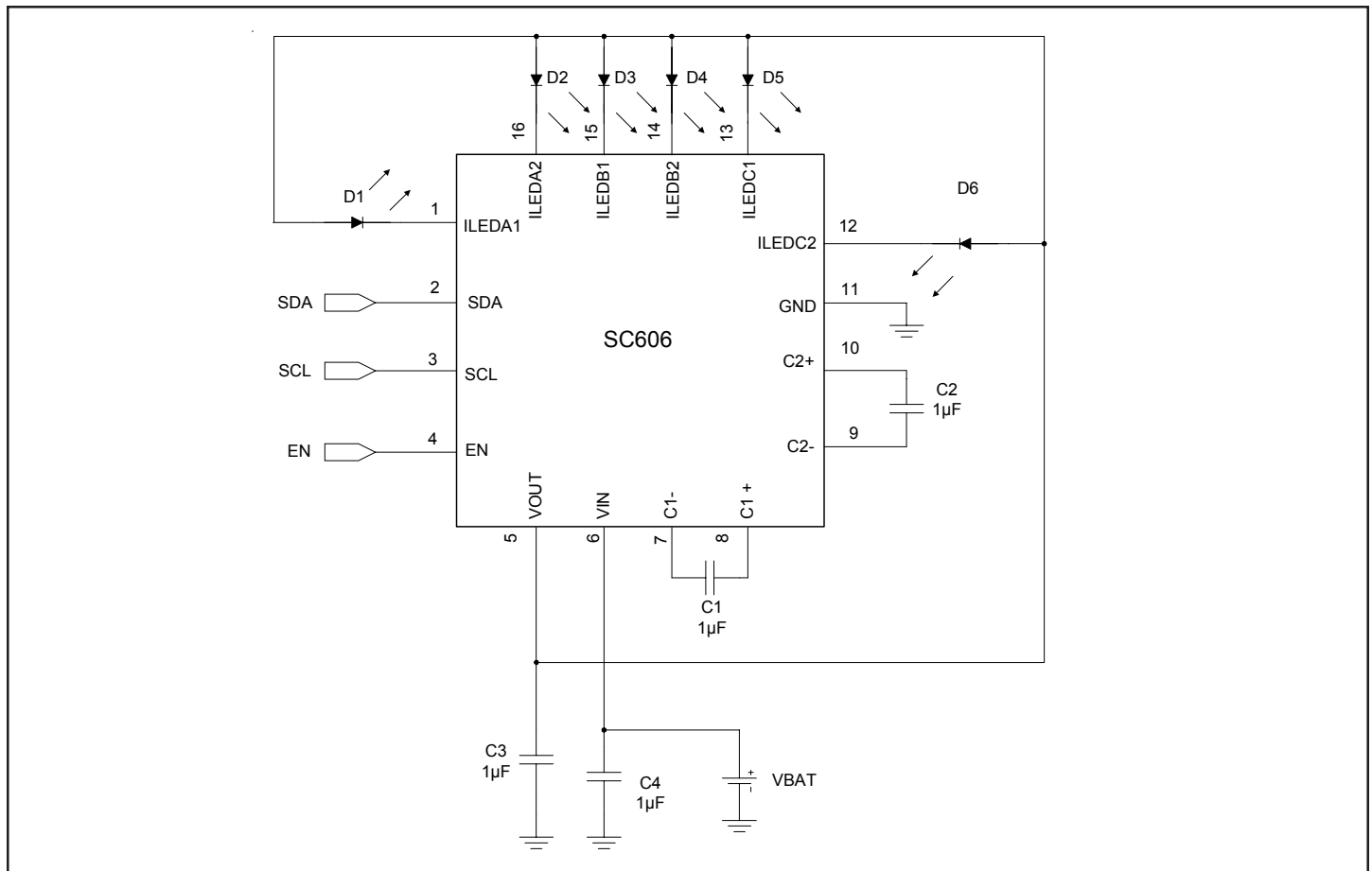
- ◆ Very High Efficiency Over 90% of Battery Life
- ◆ Current Regulation for 6 LEDs
- ◆ Current Matching Tolerance of +/- 3.5% from LED to LED
- ◆ Current Accuracy to +/- 6.5% of Specified Value
- ◆ Current Range per LED [0.5mA - 32mA]
- ◆ High Available Total LED Current =  $6 \cdot I_{LED} = 120\text{mA}$
- ◆ I<sup>2</sup>C Bus Limited Compatibility SC606
- ◆ Low Shutdown Current: 0.1µA Typical
- ◆ Soft-Start /In-rush Current Limiting
- ◆ Short Circuit /Thermal Protection
- ◆ MLP-16 [4x4] Package
- ◆ 1.33MHz and 250kHz Programmable Fixed Frequency
- ◆ Separate Brightness Zones for Multiple Displays
- ◆ Three Charge Pump Modes of Operation: 1x, 1.5x and 2x
- ◆ Open LED Output Protection

#### Applications

- ◆ Cellular Phones
- ◆ LED Backlighting
- ◆ PDA Power Supplies
- ◆ Portable Devices
- ◆ Electronic Books
- ◆ Wireless Web Appliances

#### Typical Application Circuit

Patent Pending



**POWER MANAGEMENT**
**Absolute Maximum Ratings**

Exceeding the specifications below may result in permanent damage to the device or device malfunction. Operation outside of the parameters specified in the Electrical Characteristics section is not required.

Parameter	Symbol	Maximum	Units
Supply Voltage	$V_{IN}$	-0.3 to +6.0	V
Output Voltage	$V_{OUT}$	-0.3 to +6.0	V
VOOUT Short Circuit Duration	SC	Indefinite	
Thermal Resistance, Junction to Ambient <sup>(1)</sup>	$\theta_{JA}$	40	°C/W
Thermal Resistance, Junction to Case	$\theta_{JC}$	2.4	°C/W
Operating Ambient	$T_A$	-40 to +85	°C
Junction Temperature Range	$T_{JC}$	-40 to +150	°C
Storage Temperature Range	$T_{STG}$	-65 to +150	°C
IR Reflow Temperature SC606AIMLTRT	$T_{LEAD}$	260	°C

1) Calculated from package in still air, mounted to 3" x 4.5", 4 layer FR4 PCB with thermal vias under the exposed pad per JEDEC standards.

**Electrical Characteristics**

Unless specified:  $T_A = -40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ ,  $V_{IN} = 2.85\text{V}$  to  $5.5\text{V}$ ,  $C1 = C2 = C3 = C4 = 1.0\mu\text{F}$  (ESR =  $0.03\Omega$ ), Typical values @  $T_A = 25^{\circ}\text{C}$ , LED  $V_F = 3.4\text{V}$ . This device is ESD sensitive. Use of standard ESD handling precautions is required.

Parameter	Symbol	Condition	Min	Typ	Max	Units
Quiescent Current	$I_Q$	1x mode, $I_{OUT} = 0\text{mA}$ , $V_{IN} = 4.2\text{V}$		1500	2000	$\mu\text{A}$
		1.5x mode and 2x mode, $I_{OUT} = 0\text{mA}$		3	4	mA
		Enable = 0, $V_{IN} = 4.2\text{V}$		0.1	7	$\mu\text{A}$
LED Current Accuracy	$I_{LED-ERR}$	$0.5\text{mA} \leq I_{LEDn} \leq 4.0\text{mA}^{(1)(2)}$ $3.2\text{V} \leq V_{IN} \leq 4.2\text{V}$	-260	$\pm 100$	260	$\mu\text{A}$
		$4.5\text{mA} \leq I_{LEDn} \leq 15\text{mA}$ $3.2\text{V} \leq V_{IN} \leq 4.2\text{V}$	-6.5	$\pm 2$	6.5	%
		$15.5\text{mA} \leq I_{LEDn} \leq 32\text{mA}^{(3)}$ $3.2\text{V} \leq V_{IN} \leq 4.2\text{V}$	-9	$\pm 3$	9	%
Current Matching	$I_{LED-to-LED}$	$0.5\text{mA} \leq I_{LEDn} \leq 4.0\text{mA}^{(2)}$ $3.2\text{V} \leq V_{IN} \leq 4.2\text{V}$	-140	$\pm 50$	140	$\mu\text{A}$
		$4.5\text{mA} \leq I_{LEDn} \leq 15\text{mA}$ $3.2\text{V} \leq V_{IN} \leq 4.2\text{V}$	-3	$\pm 1$	3	%
		$15.5\text{mA} \leq I_{LEDn} \leq 32\text{mA}^{(3)}$ $3.2\text{V} \leq V_{IN} \leq 4.2\text{V}$	-3.75	$\pm 1.5$	3.75	%
1x mode to 1.5x mode falling	$V_{TRANS1X}$	$I_{OUT} = 60\text{mA}$ , $I_{LEDn} = 10\text{mA}^{(1)}$		3.58		V
1.5x mode to 2x mode falling transition voltage	$V_{TRANS1.5X}$	$I_{OUT} = 60\text{mA}$ , $I_{LEDn} = 10\text{mA}^{(1)}$		2.98		V

**POWER MANAGEMENT**
**Electrical Characteristics (Cont.)**

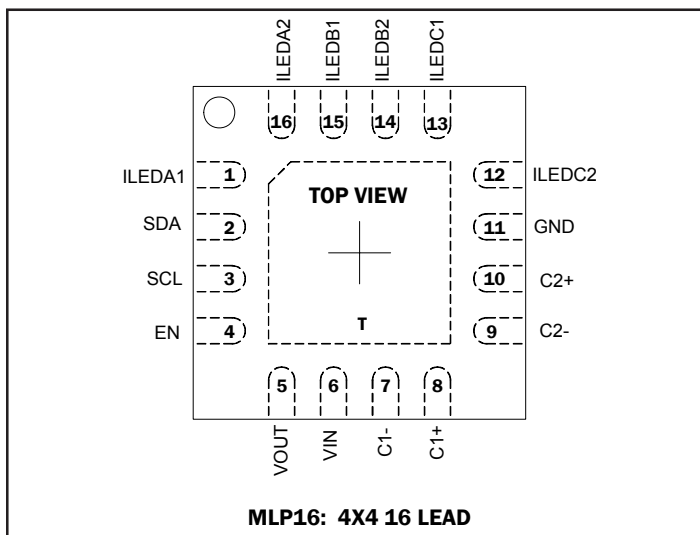
Parameter	Symbol	Condition	Min	Typ	Max	Units
Oscillator Frequency	$f_{OSC}$	ON/OFF# Status Register = X1XXXXX <sup>(4)</sup>	1.13	1.33	1.53	MHz
Oscillator Frequency	$f_{OSC}$	ON/OFF# Status Register = X0XXXXX <sup>(4)</sup>	212.5	250	287.5	kHz
Input Current Limit <sup>(2)</sup>	$I_{LIMIT}$	$3.2V \leq V_{IN} \leq 4.2V$ Short circuit applied from $V_{OUT}$ to GND		220	850	mA
Input High Threshold	$V_{IH}$	Input high logic threshold	1.6			V
Input Low Threshold	$V_{L}$	Input low logic threshold			0.4	V
Input High Current	$I_{IH}$	$V_{IH} = V_{IN}$			10	$\mu A$
Input Low Current	$I_{L}$	$V_{L} = GND$			10	$\mu A$
<b>I<sup>2</sup>C Interface</b>						
limited compliance with slave mode I <sup>2</sup> C Combined Format Philips I <sup>2</sup> C specification version 2.1 dated January, 2000						
Digital Input Voltage	$V_{L}$				0.4	V
	$V_{IH}$		1.6			
SDA Output Low Level	$V_{OL}$	$I_{DIN}(SDA) = 3mA$			0.4	V
		$I_{DIN}(SDA) = 6mA$			0.6	V
Digital Input Current	$I_{DG}$		-0.2		0.2	$\mu A$
I/O Pin Capacitance	$C_{IN}$			10		pF
<b>I<sup>2</sup>C Timing</b>						
Clock Frequency	$f_{SCL}$			400	440	kHz
SCL Low Period	$t_{LOW}$		1.3			$\mu s$
SCL High Period	$t_{High}$		0.6			$\mu s$
Data Hold Time	$t_{HD\_DAT}$		0			$\mu s$
Data Setup Time	$t_{SU\_DAT}$		100			ns
Setup Time - Repeated Start Condition	$t_{SU\_STA}$		0.6			$\mu s$
Hold Time - Repeated Start Condition	$t_{HD\_STA}$		0.6			$\mu s$
Setup Time for Stop Condition	$t_{SU\_STA}$		0.6			$\mu s$

**POWER MANAGEMENT**
**Electrical Characteristics (Cont.)**

Parameter	Symbol	Condition	Min	Typ	Max	Units
Bus-Free Time Between STOP and START	$t_{BUF}$		1.3			$\mu s$
Interface Start-up Time	$t_{EN}$	Bus Start-up Time (after EN is pulled high)			350	$\mu s$

**Notes:**

- 1)  $I_{LEDn}$  = any LED's current from D1, D2, D3, D4, D5 and D6.
- 2) Guaranteed by design.
- 3) Maximum total of LED currents not to exceed 120mA.
- 4) X = Don't care.

**POWER MANAGEMENT**
**Pin Configuration**

**Ordering Information**

DEVICE	PACKAGE <sup>(1)</sup>
SC606AIMLTRT <sup>(2)</sup>	MLP4x4-16
SC606AEVB	Evaluation Board

**Notes:**

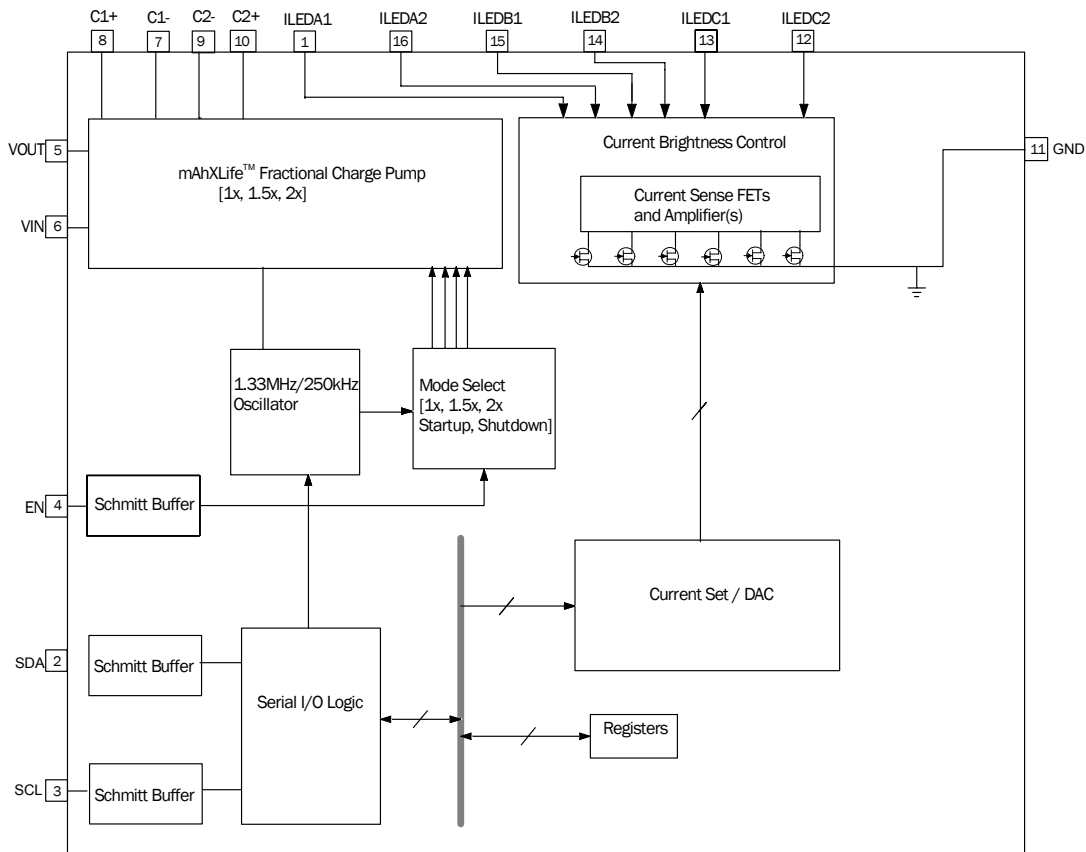
- 1) Available in tape and reel only. A reel contains 3000 devices.  
 2) Available in lead-free package only. This product is fully WEEE and RoHS compliant.

**Pin Descriptions**

Pin	Pin Name	Pin Function
1	ILEDA1	Current sink for LEDA1 (If not in use, pin may be left open or grounded).
2	SDA	Bi-directional serial data line.
3	SCL	Serial bus clock input.
4	EN	Active high enable. Bias current is typically 0.1 $\mu$ F when EN is low.
5	VOUT	Output of the charge pump. Connect a 1 $\mu$ F capacitor from VOUT to ground.
6	VIN	Input voltage. Connect a 1 $\mu$ F capacitor from VIN to ground. For improved performance when using 250 kHz and 1.5x mode, increase the capacitor to 4.7 $\mu$ F ~ 10 $\mu$ F.
7	C1-	Negative terminal of bucket capacitor 1.
8	C1+	Positive terminal of bucket capacitor 1.
9	C2-	Negative terminal of bucket capacitor 2.
10	C2+	Positive terminal of bucket capacitor 2.
11	GND	Ground.
12	ILEDC2	Current sink for LEDC2 (If not in use, pin may be left open or grounded).
13	ILEDC1	Current sink for LEDC1 (If not in use, pin may be left open or grounded).
14	ILEDB2	Current sink for LEDB2 (If not in use, pin may be left open or grounded).
15	ILEDB1	Current sink for LEDB1 (If not in use, pin may be left open or grounded).
16	ILEDA2	Current sink for LEDA2 (If not in use, pin may be left open or grounded).
T	Thermal Pad	Pad for heat sinking purposes. Connect to ground plane using multiple vias. Not connected internally.

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Block Diagram



**POWER MANAGEMENT**
**Applications Information**
**Detailed Description**

The SC606 contains a fractional charge pump, mode selection circuit, serial I/O logic, serial data registers and current regulation circuitry for 6 LED outputs. All are depicted in the Block Diagram on page 6.

The fractional charge pump multiplies the input voltage by 1, 1.5 or 2 times the input voltage. The charge pump switches at a fixed frequency that is bit selectable to 1.33MHz or 250kHz. The default frequency is 1.33MHz. 250kHz may require additional input capacitance of up to 10µF. The charge pump does not switch during 1x mode, saving power and improving efficiency.

The mode selection circuit automatically selects the mode as 1x, 1.5x or 2x based on circuit conditions such as LED voltage, input voltage and load current. 1x is the most efficient mode, followed by 1.5x and 2x modes. At lower voltages a stronger mode may be needed to maintain regulation. If so, the mode will change first to 1.5x and then later to 2x. 2x mode usually operates for a much shorter run time compared to 1x mode, and 2x mode maintains the output until the battery is discharged to 2.85V or less. The LED requiring the highest voltage drop will determine the output voltage needed to drive all outputs with sufficient anode voltage. Comparing all cathodes and regulating V<sub>OUT</sub> for the LED with the lowest cathode voltage ensures sufficient bias for all LEDs.

The LED outputs are controlled through the serial data registers, found on page 10 in Table 1. LED on/off functions are independently controlled, so that any combination of LEDs may be switched on. LED current is set per LED pair. For example, when ILEDA1 and ILEDA2 are both on, ILEDA1 = ILEDA2. But ILEDA1 and ILEDA2 do not have to be on at the same time.

Six (6) current regulating circuits sink matched currents from the LEDs on a per pair basis. LEDs with matched forward voltage will produce the best possible matched currents. For best matching performance it is recommended that the LED to LED difference, ΔV<sub>F</sub>, be under 250mV.

**Designing for Lowest Possible Battery Current**

The battery current and efficiency of the SC606 are mostly dependent on the charge pump mode of operation. To get the best performance from the SC606 it is better to use LEDs with consistently lower V<sub>F</sub> voltage. Lower V<sub>F</sub> will keep the charge pump in 1x mode longer and will use less battery current, extending the run time of the battery.

Mode transition voltages V<sub>TRANS1X</sub> and V<sub>TRANS1.5X</sub> can be estimated by the following equations:

$$V_{\text{TRANS1X}} = V_F + V_{\text{ILEDn}} + [(\# \text{ of LEDs used}) \cdot I_{\text{LED}} \cdot 1.2]$$

$$V_{\text{TRANS1.5X}} = [V_F + V_{\text{ILEDn}} + [(\# \text{ of LEDs used}) \cdot I_{\text{LED}} \cdot 16]] / 1.5$$

where, V<sub>F</sub> is the anode to cathode voltage and V<sub>ILEDn</sub> is the voltage at the ILED pin. Typically V<sub>ILED</sub> = 120mV and I<sub>LED</sub> is the LED current.

Power efficiency can be estimated for the intended battery voltage range.

$$\eta = [V_{\text{OUT}} \cdot I_{\text{OUT}} / V_{\text{IN}} \cdot (I_{\text{OUT}} \cdot \text{Mode} + I_Q)] \cdot 100 \%$$

where, V<sub>OUT</sub> = V<sub>F</sub> + V<sub>ILEDn</sub>  
 and I<sub>Q</sub> = 1.5mA, in 1x mode  
 I<sub>Q</sub> = 3mA, in 1.5x or 2x mode

**Quiescent Current**

I<sub>Q</sub> at no load will vary with the device state. A sequence of steps is now described which will demonstrate the effect that the device state has on I<sub>Q</sub> when VIN = 3.8V.

(1) After power up (Enable High) and before any serial communication, the I<sub>Q</sub> is approximately 2.2mA. This is because the output defaults to 5V and the charge pump is active to support the 5V. The charge pump also defaults to 1.33MHz.

(2) After power up if the clock is changed to 250kHz, the I<sub>Q</sub> will decrease to 1mA.

(3) If one LED is set on at 0.5mA, the input current will be 1.5mA. For a typical white LED, the 5V output is much higher than necessary, so the charge pump will switch off and the output will adjust to a normal value for the LED, typically around 3.5V.

(4) Turn off the LED and I<sub>Q</sub> = I<sub>IN</sub> = 80µA with Enable = High. This is the lowest power state while Enable = High.

**I<sub>LED</sub> Accuracy**

I<sub>LED</sub> is determined by the status of registers at 00h, 01h and 02h. The tolerance of the I<sub>LED</sub> current is +/-6.5% at the 10mA setting. For example, if the data registers are configured so that each LED current should be 10mA, the actual LED currents would be between 9.35mA and 10.65mA (+/-6.5%). All 6 outputs meet this requirement over the industrial temperature range. To calculate the error I<sub>LED-ERR</sub>[%], use the formula,

$$I_{\text{LED-ERR}}[\%] = \pm \left[ \frac{I_{\text{LED(measured)}} - I_{\text{LED}}}{I_{\text{LED}}} \right] \cdot 100\%$$

**POWER MANAGEMENT**

**Applications Information (Cont.)**

**Current Matching**

Current Matching refers to the  $\Delta I$  from an LED compared to the average of the minimum and maximum value of all LEDs that are programmed for the same current.

$$I_{\text{LED-LED-ERR}} [\%] = \left( \frac{\frac{I_{\text{MAX}}}{I_{\text{MAX}} + I_{\text{MIN}}} - 1}{2} \right) \cdot 100\%$$

or

$$\left( \frac{\frac{I_{\text{MIN}}}{I_{\text{MAX}} + I_{\text{MIN}}} - 1}{2} \right) \cdot 100\%$$

which reduces to  $\pm$

$$\left( \frac{I_{\text{MAX}} - I_{\text{MIN}}}{I_{\text{MAX}} + I_{\text{MIN}}} \right) \cdot 100\%$$

**1x Mode, 1.5x Mode and 2x Mode**

1x Mode, 1.5x Mode and 2x Mode all refer to the charge pump configuration. These modes multiply the input voltage and ensure that  $V_{\text{OUT}}$  is high enough for current to be regulated in the LEDs.

**Mode Transition Voltage**

Mode transition voltage refers to the input voltage at the point when the charge pump changes from a weaker mode (lower numerically) to a stronger mode (higher numerically).  $V_{\text{TRANS1X}}$  is the transition from 1x to 1.5x mode, and  $V_{\text{TRANS1.5X}}$  is the transition from 1.5x to 2x mode.



**POWER MANAGEMENT**

**Applications Information (Cont.)**

**I<sup>2</sup>C Communication**

The SC606 interface uses a limited version of the combined format protocol as described in the Phillips I<sup>2</sup>C Bus Specification version 2.1. With this format, the Start condition and the Slave Address are both repeated. Data formatting must be a single byte only. Note that the SC606 can only operate on an I<sup>2</sup>C bus using the limited combined format protocol. If any other I<sup>2</sup>C data formatting is used on the bus the SC606 may exhibit false acknowledges to the commands. The I<sup>2</sup>C Slave Address is 1100110. I<sup>2</sup>C Fast Mode is supported at 400kbit/s. For more information about the I<sup>2</sup>C combined protocol refer to the I<sup>2</sup>C Bus Specification from Philips Semiconductors.

**Slave Address**

Following a start condition, the bus master outputs the address of a slave device. The 7 bit slave address for the SC606 is 1100110. The address is followed by a least significant bit (LSB). The LSB determines the data direction.

<b>MSB</b>							<b>LSB</b>
1	1	0	0	1	1	0	R/W

**Data Formatting**

**Write Format**

S	Slave Address	W	A	1 Byte Register Address	A	Sr	Slave Address	W	A	1 Byte Only nData	A	P
---	---------------	---	---	-------------------------	---	----	---------------	---	---	-------------------	---	---

**Read Format**

S	Slave Address	W	A	1 Byte Register Address	A	Sr	Slave Address	R	A	1 Byte Only nData	B	P
---	---------------	---	---	-------------------------	---	----	---------------	---	---	-------------------	---	---

- S : Start Condition
- W : '0' = Write
- R : '1' = Read
- A : Acknowledge, sent by slave
- B : Acknowledge, sent by master
- Sr: Repeated Start Condition
- P : Stop Condition

Slave Address: 7 bit  
 Register Address: 8 bit  
 Data: 8 bit

**POWER MANAGEMENT**

**Applications Information (Cont.)**

**Table 1 - SERIAL DATA REGISTERS**

Register Name	Register Address [8-bit Hexadecimal]	Registers' Bit Function Table							
		B7	B6	B5	B4	B3	B2	B1	B0
LED_A12 Reg	00h	X	X	Refer to Table 2 on Page 11					
LED_B12 Reg	01h								
LED_C12 Reg	02h								
ON/OFF# Reg	03h	0	Frequency 1 = 250kHz 0 = 1.33MHz	LEDC2 1 = On 0 = Off	LEDC1 1 = On 0 = Off	LEDB2 1 = On 0 = Off	LEDB1 1 = On 0 = Off	LEDA2 1 = On 0 = Off	LEDA1 1 = On 0 = Off

Note: X = Don't care  
 1 = Logic High  
 0 = Logic Low

**POWER MANAGEMENT**

**Applications Information (Cont.)**

**Table 2 - DAC Codes For LED Output Current**

LED Current [mA]	B7	B6	B5	B4	B3	B2	B1	B0	Decimal
0.5	X	X	0	0	0	0	0	0	0
1.0	X	X	0	0	0	0	0	1	1
1.5	X	X	0	0	0	0	1	0	2
2.0	X	X	0	0	0	0	1	1	3
2.5	X	X	0	0	0	1	0	0	4
3.0	X	X	0	0	0	1	0	1	5
3.5	X	X	0	0	0	1	1	0	6
4.0	X	X	0	0	0	1	1	1	7
4.5	X	X	0	0	1	0	0	0	8
5.0	X	X	0	0	1	0	0	1	9
5.5	X	X	0	0	1	0	1	0	10
6.0	X	X	0	0	1	0	1	1	11
6.5	X	X	0	0	1	1	0	0	12
7.0	X	X	0	0	1	1	0	1	13
7.5	X	X	0	0	1	1	1	0	14
8.0	X	X	0	0	1	1	1	1	15
8.5	X	X	0	1	0	0	0	0	16
9.0	X	X	0	1	0	0	0	1	17
9.5	X	X	0	1	0	0	1	0	18
10.0	X	X	0	1	0	0	1	1	19
10.5	X	X	0	1	0	1	0	0	20
11.0	X	X	0	1	0	1	0	1	21
11.5	X	X	0	1	0	1	1	0	22
12.0	X	X	0	1	0	1	1	1	23
12.5	X	X	0	1	1	0	0	0	24
13.0	X	X	0	1	1	0	0	1	25
13.5	X	X	0	1	1	0	1	0	26
14.0	X	X	0	1	1	0	1	1	27
14.5	X	X	0	1	1	1	0	0	28
15.0	X	X	0	1	1	1	0	1	29
15.5	X	X	0	1	1	1	1	0	30
16.0	X	X	0	1	1	1	1	1	31

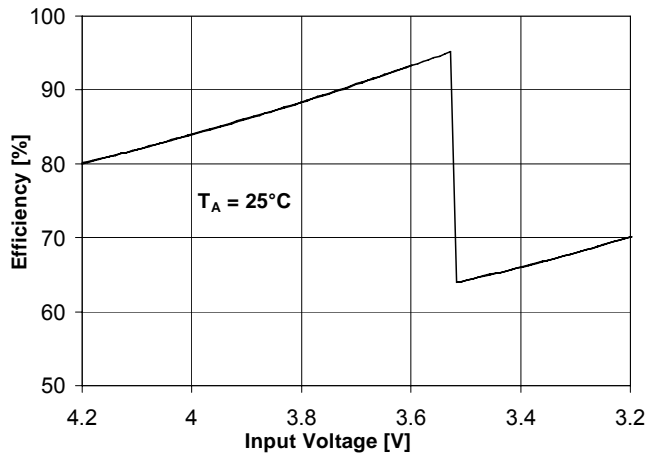
LED Current [mA]	B7	B6	B5	B4	B3	B2	B1	B0	Decimal
16.5	X	X	1	0	0	0	0	0	32
17.0	X	X	1	0	0	0	0	1	33
17.5	X	X	1	0	0	0	1	0	34
18.0	X	X	1	0	0	0	1	1	35
18.5	X	X	1	0	0	1	0	0	36
19.0	X	X	1	0	0	1	0	1	37
19.5	X	X	1	0	0	1	1	0	38
20.0	X	X	1	0	0	1	1	1	39
20.5	X	X	1	0	1	0	0	0	40
21.0	X	X	1	0	1	0	0	1	41
21.5	X	X	1	0	1	0	1	0	42
22.0	X	X	1	0	1	0	1	1	43
22.5	X	X	1	0	1	1	0	0	44
23.0	X	X	1	0	1	1	0	1	45
23.5	X	X	1	0	1	1	1	0	46
24.0	X	X	1	0	1	1	1	1	47
24.5	X	X	1	1	0	0	0	0	48
25.0	X	X	1	1	0	0	0	1	49
25.5	X	X	1	1	0	0	1	0	50
26.0	X	X	1	1	0	0	1	1	51
26.5	X	X	1	1	0	1	0	0	52
27.0	X	X	1	1	0	1	0	1	53
27.5	X	X	1	1	0	1	1	0	54
28.0	X	X	1	1	0	1	1	1	55
28.5	X	X	1	1	1	0	0	0	56
29.0	X	X	1	1	1	0	0	1	57
29.5	X	X	1	1	1	0	1	0	58
30.0	X	X	1	1	1	0	1	1	59
30.5	X	X	1	1	1	1	0	0	60
31.0	X	X	1	1	1	1	0	1	61
31.5	X	X	1	1	1	1	1	0	62
32.0	X	X	1	1	1	1	1	1	63

Note: X = Don't care

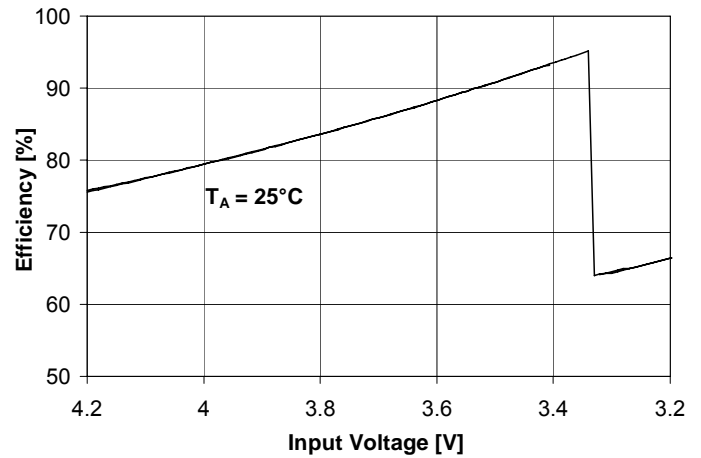
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Typical Characteristics

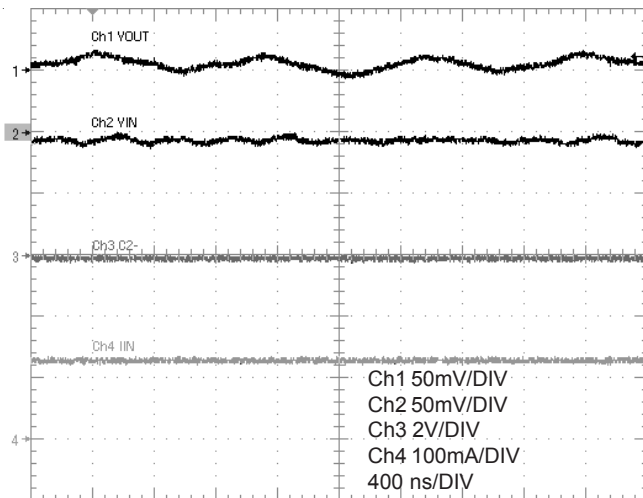
Efficiency for 6 LEDs at 20mA and 3.31V



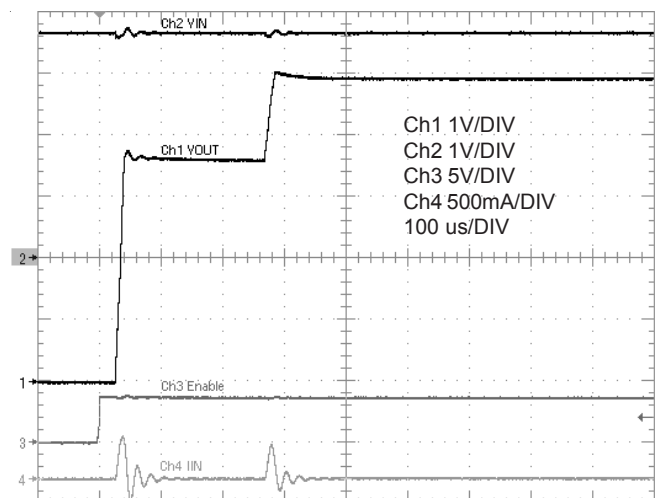
Efficiency for 6 LEDs at 10mA and 3.31V



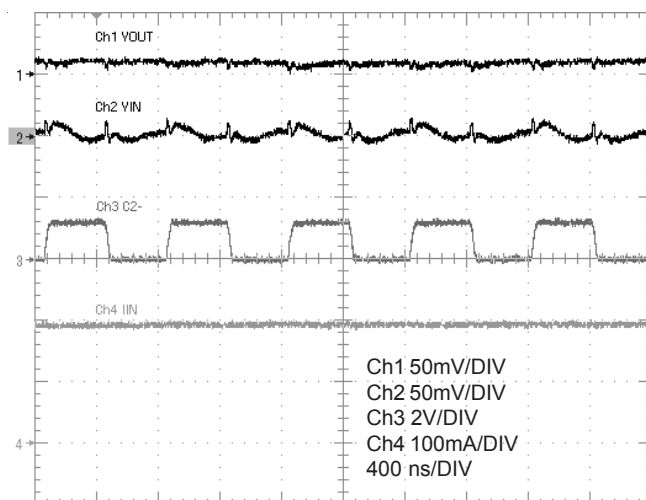
Ripple in 1x Mode for 6 LEDs at 20mA



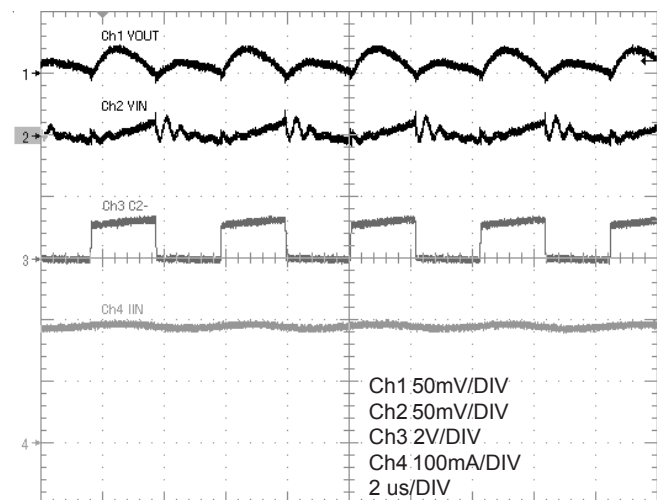
Startup



1.33MHz Ripple in 1.5x Mode for 6 LEDs at 20mA



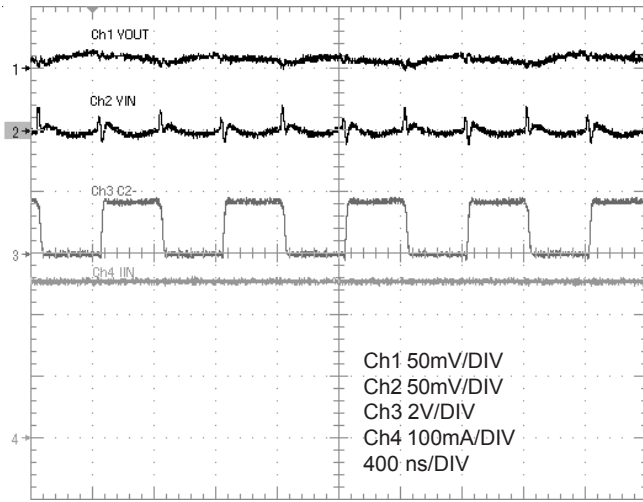
250kHz Ripple in 1.5x Mode for 6 LEDs at 20mA



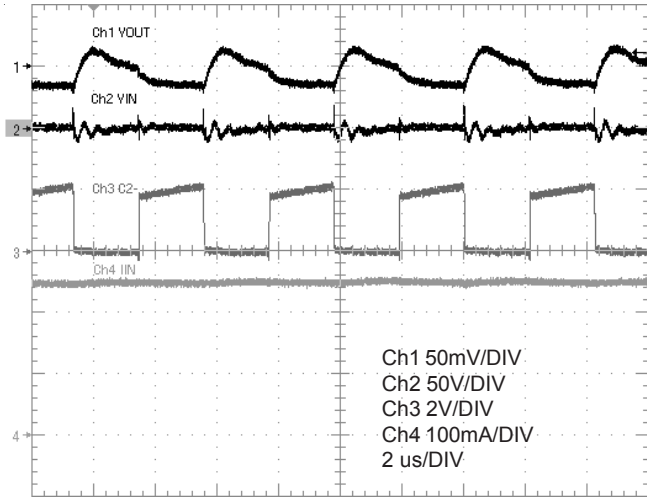
**POWER MANAGEMENT**

**Typical Characteristics (Cont.)**

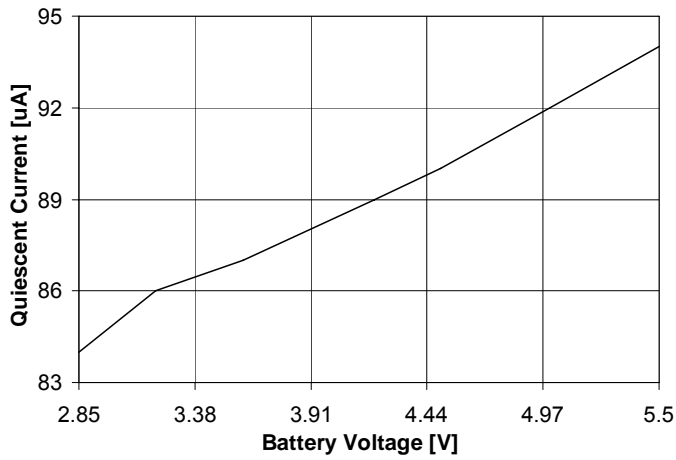
**1.33MHz Ripple in 2x Mode for 6 LEDs at 20mA**



**250kHz Ripple in 2x Mode for 6 LEDs at 20mA**

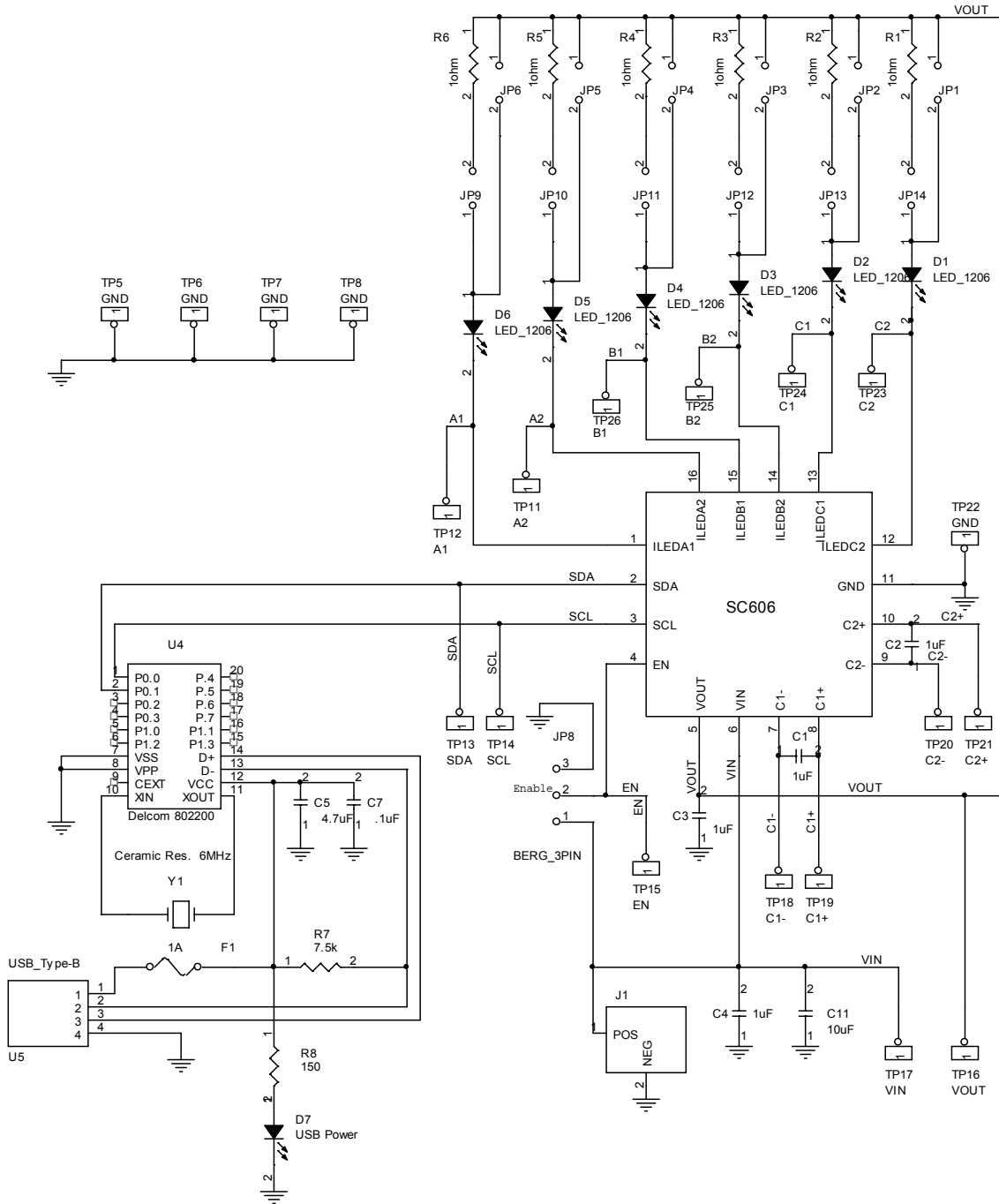


**$I_Q$ , LEDs Turned Off**



POWER MANAGEMENT

Evaluation Board Schematic



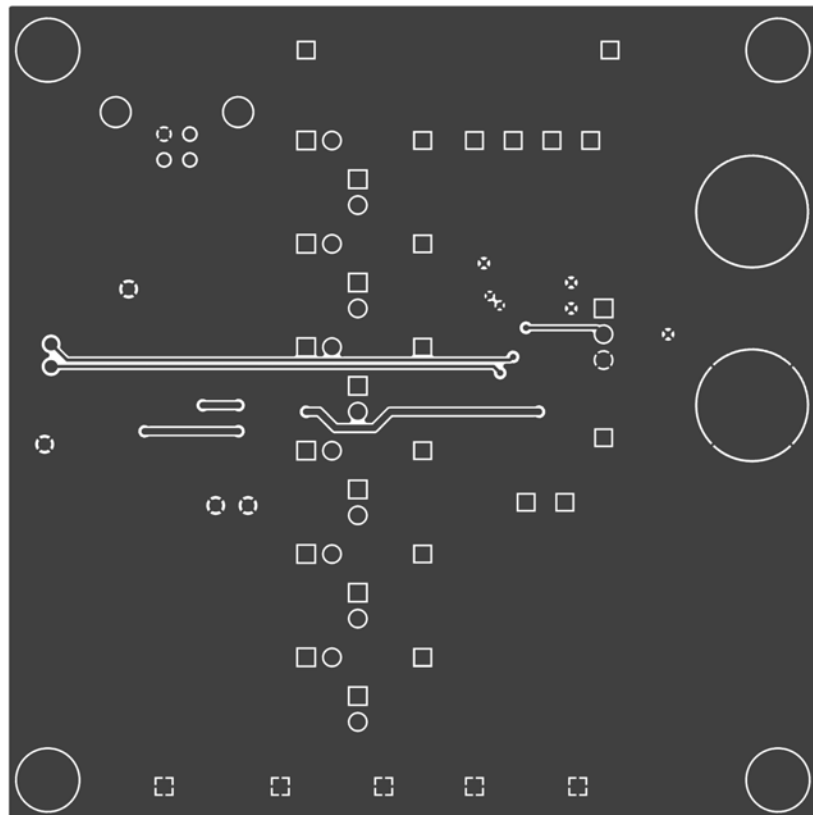
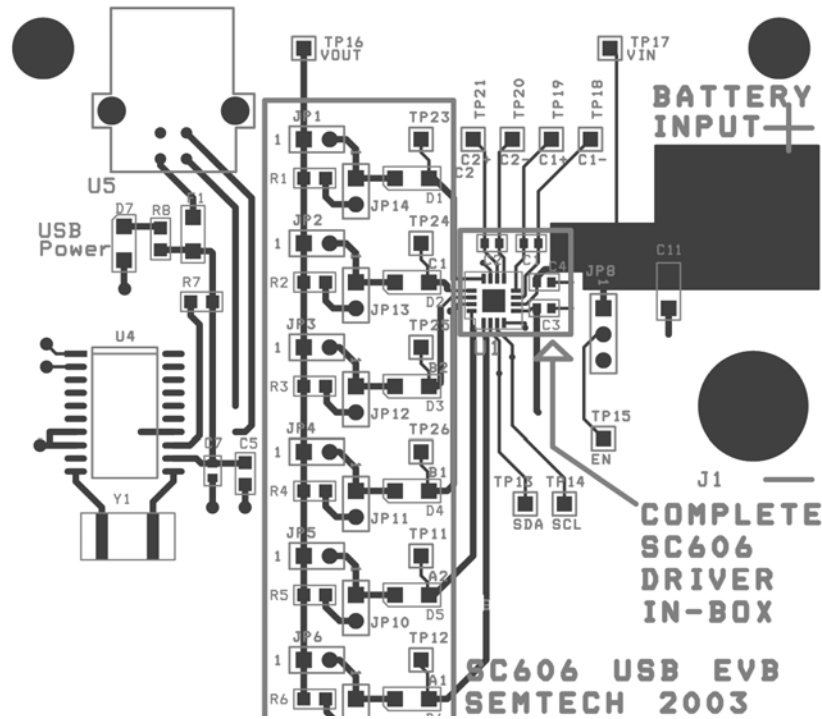
**POWER MANAGEMENT**

**Evaluation Board Bill of Material**

ITEM	QUANTITY	REFERENCE	PART
1	4	C1, C2, C3, C4	1UF X5R
2	1	C5	4.7UF
3	1	C7	.1UF
4	1	C11	10UF
5	6	D1, D2, D3, D4, D5, D6	LED_1206 NICHIA NSCW100
6	1	D7	USB POWER
7	1	F1	1A
8	12	JP1, JP2, JP3, JP4, JP5, JP6, JP9, JP10, JP11, JP12, JP13, JP14	2PIN JUMPER
9	1	JP8	3PIN JUMPER
10	1	J1	BATTERY INPUT
11	6	R1, R2, R3, R4, R5, R6	1OHM
12	1	R7	7.5K
13	1	R8	150
14	5	TP5, TP6, TP7, TP8, TP22	GND
15	1	TP11	A2
16	1	TP12	A1
17	1	TP13	SDA
18	1	TP14	SCL
19	1	TP15	EN
20	1	TP16	VOUT
21	1	TP17	VIN
22	1	TP18	C1-
23	1	TP19	C1+
24	1	TP20	C2-
25	1	TP21	C2+
26	1	TP23	C2
27	1	TP24	C1
28	1	TP25	B2
29	1	TP26	B1
30	1	U1	SC606
31	1	U4	DELCOM 802200
32	1	U5	USB_TYPE-B
33	1	Y1	CERAMIC RES. 6MHZ

POWER MANAGEMENT

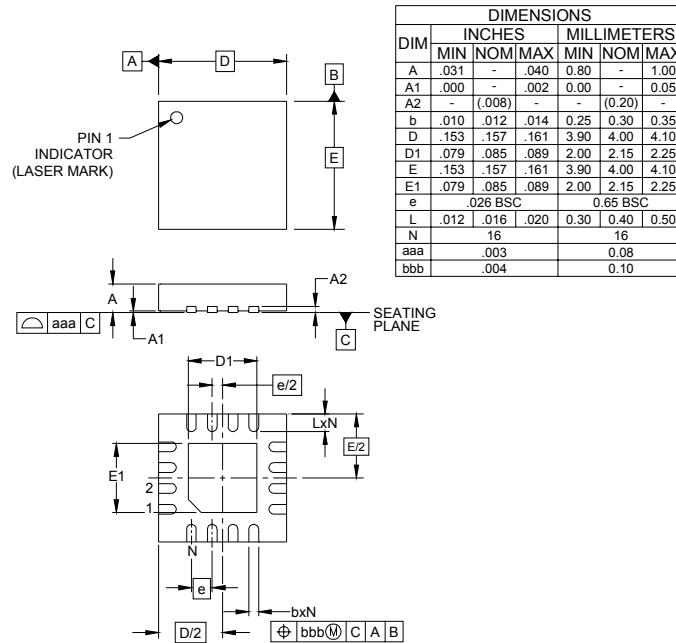
Evaluation Board Gerber Plots





POWER MANAGEMENT

Outline Drawing - MLP-16 [4x4]

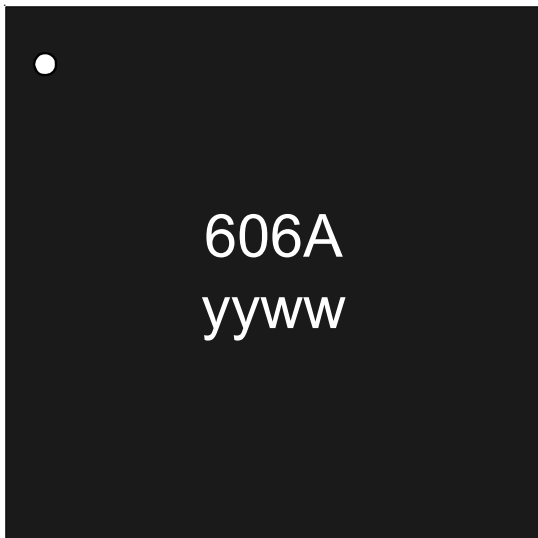


NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

Marking Information

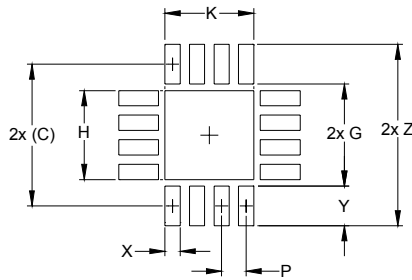
Marking for SC606AIML



yyww = Datecode (Example: 0422)

**POWER MANAGEMENT**

**Land Pattern - MLP-16 [4x4]**



DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	(.156)	(3.95)
G	.122	3.10
H	.091	2.30
K	.091	2.30
P	.026	0.65
X	.016	0.40
Y	.033	0.85
Z	.189	4.80

- NOTES:
1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

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