Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

PanelMatch™ LXMG1643-12-64

12V Quad 6W CCFL Programmable Inverter Module

PRODUCTION DATASHEET

DESCRIPTION

The LXMG1643-12-64 is a Quad 6W Output *Direct Drive*™ CCFL (Cold Cathode Fluorescent Lamp) Inverter Module specifically designed for driving LCD backlight lamps. It is ideal for driving the 15" NEC NL10276BC30-17, AOU G150XG02, or similar TFT LCD panels.

The LXMG1643 modules provide the designer with a vastly superior display brightness range than is typical with analog (current amplitude control) dimming.

The inverter includes a dimming input that permits brightness control from either a DC voltage source or a PWM signal or an external potentiometer. The maximum output current is externally programmable over a range of 5 to 8mA in 1mA steps to allow the inverter to match properly to a wide array of LCD panel lamp current specifications.

The RangeMAX™ Digital Dimming Technique provides flicker-free brightness control in any wide range (typically 50:1+) dimming application.

The resultant "burst drive" that energizes the lamp was designed specifically to ensure that no premature lamp degradation occurs, while allowing significant power savings at lower dim levels.

The modules convert the DC voltage from the system battery or AC adapter directly to high frequency, high-voltage waves required to ignite and operate CCFL lamps.

The LXMG1643-12-64 inverter is intended for panel assemblies with two high and two low lamp connections, each sharing the same connector. Three other quad lamp versions, the LXMG1643-12-61, LXMG1643-12-62 and the LXMG1643-12-63, are available to match other quad lamp panels with alternative output connector configurations.

Other benefits of this new topology are stable fixed-frequency operation, secondary-side strike-voltage regulation, and both open / shorted lamp protection with fault timeout.

IMPORTANT: For the most current data, consult *MICROSEMI*'s website: http://www.microsemi.com

Protected By U.S. Patents: 5,923,129; 5,930,121; 6,298,234; Patents Pending

KEY FEATURES

- Externally Programmable Maximum Output Current
- Easy to Use Brightness Control
- RangeMAX™ Wide Range Dimming
- Output Short-Circuit Protection and Automatic Strike-Voltage Regulation and Timeout
- Fixed Frequency Operation
- Rated From -20 to 70°C
- RoHS Compliant
- UL 60950 E175910

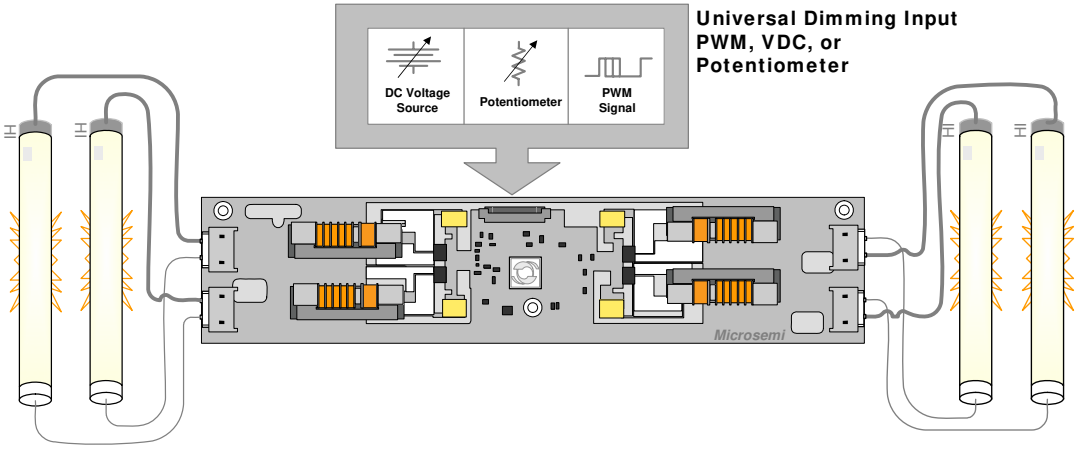
APPLICATIONS

- High Brightness Displays
- Desktop Displays
- Industrial Display Controls

BENEFITS

- Smooth, Flicker Free 2%-100% Full-Range Brightness Control
- Programmable Output Current Allows Inverter to Mate With a Wide Variety of LCD Panel Specifications

PRODUCT HIGHLIGHT



PACKAGE ORDER INFO

PART NUMBER RoHS Compliant	OUTPUT CONNECTORS	INVERTER MATES DIRECTLY TO PANEL CONNECTORS
LXMG1643-12-64	Four JST SM02(8.0)B-BHS-1-TB(LF)(SN) or Yeon Ho 20015WR-05A00 or equivalent connectors	JST BHR-03VS-1 or equivalent connectors

Rev. 1.1, 2006-11-16

Microsemi
Integrated Products
11861 Western Avenue, Garden Grove, CA. 92841, 714-898-8121, Fax: 714-893-2570

ABSOLUTE MAXIMUM RATINGS (NOTE 1)

Input Signal Voltage (V_{IN1}) ..... -0.3V to 15V
Input Power 30W
Output Voltage, no load ..... Internally Limited to 2000V_{RMS}
Output Current (each output) ..... 9.5mA_{RMS} (Internally Limited)
Output Power (each output) 6.0W
Input Signal Voltage ($\overline{SLEEP}$ Input) ..... -0.3V to V_{IN1}
Input Signal Voltage (BRITE) ..... -0.3V to 5.5V
Ambient Operating Temperature, zero airflow ..... -20°C to 70°C
Storage Temperature Range ..... -40°C to 85°C

Note 1: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of specified terminal.

RECOMMENDED OPERATING CONDITIONS (R.C.)

This module has been designed to operate over a wide range of input and output conditions. However, best efficiency and performance will be obtained if the module is operated under the condition listed in the 'R.C.' column. Min. and Max. columns indicate values beyond which the inverter, although operational, will not function optimally.

Parameter	Symbol	Recommended Operating Conditions			Units
		Min	R.C.	Max	
Input Supply Voltage Range (Fully Regulated Lamp Current)	V_{IN1}	10.8	12	13.2	V
Input Supply Voltage Range (Functional)		10.2	12	13.8	
Output Power (each output)	P_O		5.0	6.0*	W
Linear BRITE Control Input Voltage Range	V_{BRT_ADJ}	0.5		2.0	V
Lamp Operating Voltage	V_{LAMP}	530	625	730	V_{RMS}
Lamp Current (Full Brightness)	I_{OLAMP}	5		8	mA_{RMS}
Operating Ambient Temperature Range	T_A	-20		70	°C

*Total output power must not exceed 6W. Higher voltage lamps may require maximum output current to be set lower than 8mA_{RMS}

ELECTRICAL CHARACTERISTICS

The following specifications apply over the recommended operating condition and ambient temperature of 25°C except where otherwise noted.

Parameter	Symbol	Test Conditions	LXMG1643-12-64			Units
			Min	Typ	Max	
OUTPUT PIN CHARACTERISTICS						
Full Bright Lamp Current (each output)	$I_{L(MAX)}$	$V_{BRT\_ADJ} \geq 2.0V_{DC}$, $\overline{SLEEP} \geq 2.0V$, $V_{IN1} = 12V_{DC}$ I_{SET1} = Ground, I_{SET2} = Ground	4.0	5	5.5	mA_{RMS}
Full Bright Lamp Current (each output)	$I_{L(MAX)}$	$V_{BRT\_ADJ} \geq 2.0V_{DC}$, $\overline{SLEEP} \geq 2.0V$, $V_{IN1} = 12V_{DC}$ I_{SET1} = Ground, I_{SET2} = Open	5.0	6	6.6	mA_{RMS}
Full Bright Lamp Current (each output)	$I_{L(MAX)}$	$V_{BRT\_ADJ} \geq 2.0V_{DC}$, $\overline{SLEEP} \geq 2.0V$, $V_{IN1} = 12V_{DC}$ I_{SET1} = Open, I_{SET2} = Ground	6.0	7	7.7	mA_{RMS}
Full Bright Lamp Current (each output)	$I_{L(MAX)}$	$V_{BRT\_ADJ} \geq 2.0V_{DC}$, $\overline{SLEEP} \geq 2.0V$, $V_{IN1} = 12V_{DC}$ I_{SET1} = Open, I_{SET2} = Open	7.0	8	8.8	mA_{RMS}
Output Current Lamp to Lamp Deviation	$I_{LL\%DEV}$	$V_{BRT\_ADJ} \geq 2.0V_{DC}$, $\overline{SLEEP} \geq 2.0V$, $V_{IN1} = 12V_{DC}$ I_{SET1} = Open, I_{SET2} = Open		3	10	%
Min. Average Lamp Current (each output)	$I_{L(MIN)}$	$V_{BRT\_ADJ} \leq 0.5V_{DC}$, $\overline{SLEEP} \geq 2.0V$, $V_{IN1} = 12V_{DC}$ $I_{SET1} = I_{SET2}$ = Ground		.30		mA_{RMS}
Lamp Start Voltage	V_{LS}	-20°C < T_A < 70°C, $V_{IN1} > 10.8V_{DC}$	1500	1650		V_{RMS}
Operating Frequency	f_O	$V_{BRT\_ADJ} = 2.5V_{DC}$, $\overline{SLEEP} \geq 2.0V$, $V_{IN1} = 12V$	69	72	75	kHz
Burst Frequency	f_{BURST}	Output Burst Frequency	269	281	293	Hz

Microsemi
Integrated Products
11861 Western Avenue, Garden Grove, CA. 92841, 714-898-8121, Fax: 714-893-2570

ELECTRICAL CHARACTERISTICS (CONTINUED)

The following specifications apply over the recommended operating condition and ambient temperature of 25°C except where otherwise noted.

Parameter	Symbol	Test Conditions	LXMG1643-12-64 Min	Typ	Max	Units
BRITE INPUT						
Input Current	I_{BRT}	V_{BRT_ADJ} = 0V_{DC}		-300		μA_{DC}
		V_{BRT_ADJ} = 3V_{DC}		50		μA_{DC}
Minimum Input for Max. Lamp Current	V_{BRT_ADJ}	$I_{O(LAMP)}$ = Maximum Lamp Current		2.0	2.05	V_{DC}
Maximum Input for Min. Lamp Current	V_{BRT_ADJ}	$I_{O(LAMP)}$ = Minimum Lamp Current	0.4	0.5		V_{DC}
SLEEP INPUT						
RUN Mode	$V_{\overline{SLEEP}}$		2.0		V_{IN1}	V_{DC}
SLEEP Mode	$V_{\overline{SLEEP}}$		-0.3		0.8	V_{DC}
$SET_{1,2}$ INPUT						
$SET_{1,2}$ Low Threshold	V_L				0.4	V
Input Current	I_{SET}	$V_{SET} \leq 0.4V$		-300		µA
POWER CHARACTERISTICS						
Sleep Current	$I_{IN(MIN)}$	V_{IN1} = 12V_{DC}, $\overline{SLEEP} \leq 0.8V$	0.0	10	30	μA_{DC}
Run Current	I_{RUN}	V_{IN1} = 12V_{DC}, $\overline{SLEEP} \geq 2.0V$, I_{SET1} = Open I_{SET2} = Ground, V_{LAMP} = 550V_{RMS}		1450		mA_{DC}
Efficiency	η	V_{IN1} = 12V_{DC}, $\overline{SLEEP} \geq 2.0V$, I_{SET1} = Open I_{SET2} = Ground, V_{LAMP} = 550V_{RMS}		88		%

FUNCTIONAL PIN DESCRIPTION

CONN	PIN	DESCRIPTION
CN1 (Molex 53261-1271) Mates with 51021-1200 housing, 50079-8100 pins. Mates with LX9508G input cable assembly		
CN1-1,2,3	V_{IN1}	Main Input Power Supply (10.8V $\leq V_{IN1} \leq$ 13.2V)
CN1-4,5,6	GND	Power Supply Return
CN1-7	AGND	Analog Signal Ground
CN1-8	NC	No Connect
CN1-9	$\overline{SLEEP}$	ON / OFF Control. (0V < $\overline{SLEEP}$ < 0.8 = OFF, $\overline{SLEEP}$ >= 2.0V = ON
CN1-10	BRITE	Brightness Control (0.5V to 2.0V_{DC}). 2.0V_{DC} gives maximum lamp current.
CN1-11	SET_1	SET_1 MSB Connecting this pin to ground decreases the output current (see Table 1)
CN1-12	SET_2	SET_2 LSB Connecting this pin to ground decreases the output current (see Table 1)
CN2-CN5 (JST SM02(8.0)B-BHS-1-TB(LF)(SN) or Yeon Ho 20015WR-05A00)		
CN2-CN5-1	V_{HI1}	High voltage connection to high Side of lamp. Connect to lamp terminal with shortest lead length. **DO NOT** connect to Ground.
CN2-CN5-2	V_{LO}	Connection to low side of lamp. Connect to lamp terminal with longer lead length. **DO NOT** connect to Ground.

Microsemi
Integrated Products
11861 Western Avenue, Garden Grove, CA. 92841, 714-898-8121, Fax: 714-893-2570

TABLE 1

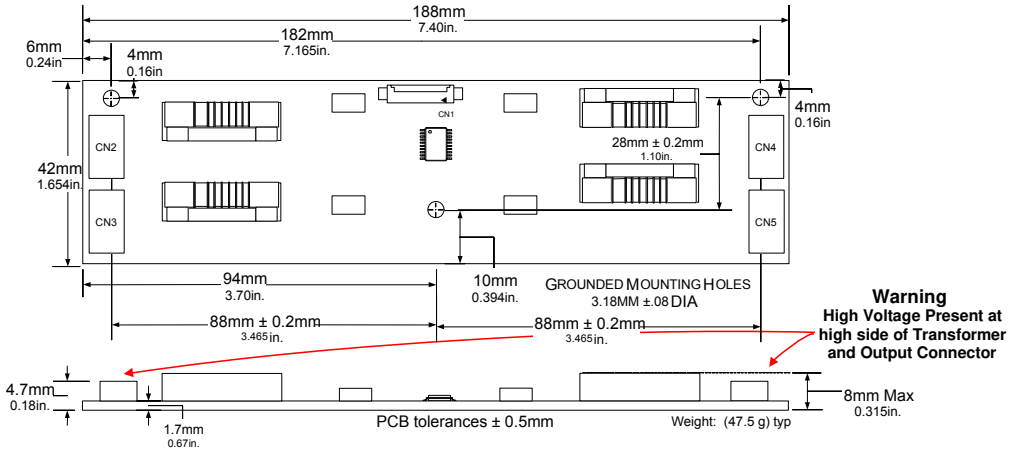
OUTPUT CURRENT SETTINGS

SET_1 (Pin 11)	SET_2 (Pin 12)	Nominal Output Current
Open*	Open*	8.0mA
Open*	Ground	7.0mA
Ground	Open*	6.0mA
Ground	Ground	5.0mA

* If driven by a logic signal it should be open collector or open drain only, not a voltage source.

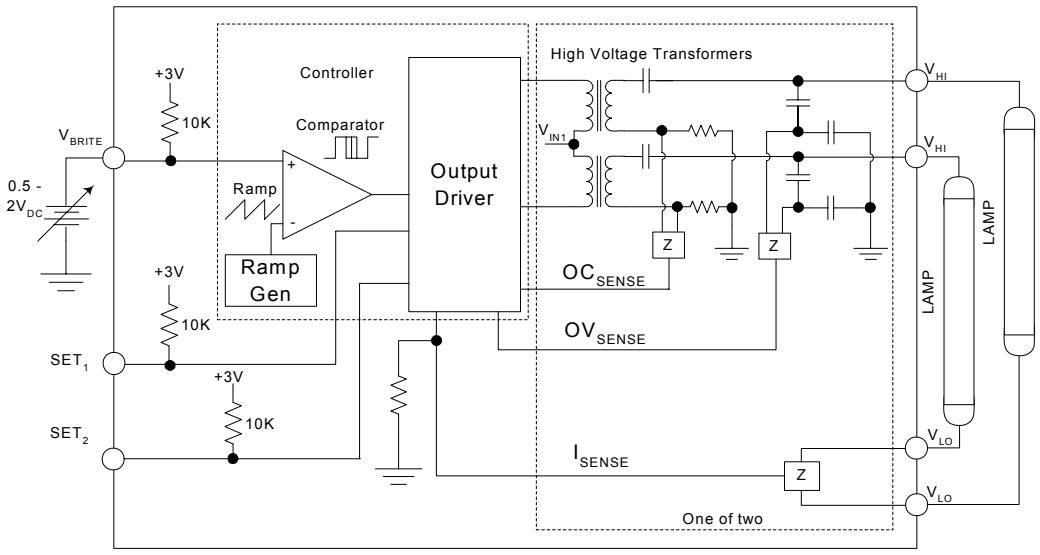
PHYSICAL DIMENSIONS

LXMG1643-12-64



All dimensions are in millimeters, inches are for reference only.

SIMPLIFIED BLOCK DIAGRAM



TYPICAL APPLICATION

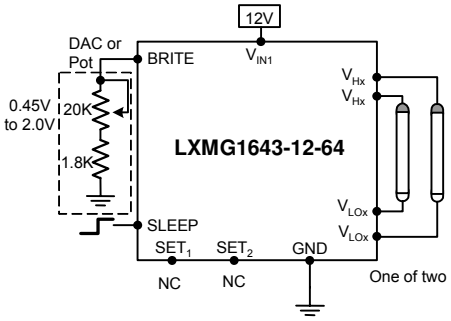


Figure 1 – Brightness Control
(Output current set to maximum)

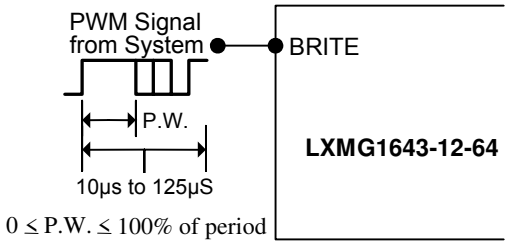
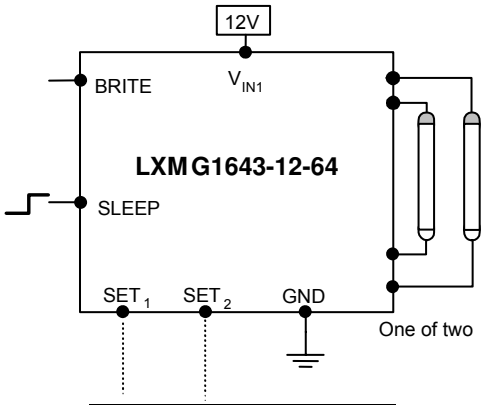


Figure 1A – PWM Brightness Control



L	L	5.0mA$_{RMS}$
L	H	6.0mA$_{RMS}$
H	L	7.0mA$_{RMS}$
H	H	8.0mA$_{RMS}$

L=GND; H=Open

Figure 2 – Max Output Current
(SET_1 and SET_2 Inputs)

- The brightness control may be a voltage output DAC or other voltage source, a digital pot or 20K manual pot. The inverter contains an internal 10K pull-up to 3V to bias the pot add a 1.8K resistor to set the lower threshold voltage. A 3.3V Logic Level PWM signal from a micro-controller may also be used as shown in Figure 1A.
- If you need to turn the inverter ON / OFF remotely, connect to TTL logic signal to the $\overline{\text{SLEEP}}$ input.
- Connect V_{HI} to high voltage wire from the lamp. Connect V_{LO} to the low voltage wire (wire with thinner insulation). Never connect V_{LO} to circuit ground as this will defeat lamp current regulation. If both lamp wires have heavy high voltage insulation, connect the longest wire to V_{LO}. This wire is typically white.
- Use the SET_1 and SET_2 (see Figure 2) inputs to select the desired maximum output current. Using these two pins in combination allows the inverter to match a wide variety of panels from different manufactures. Generally, the best lamp lifetime correlates with driving the CCFL at the manufactures nominal current setting. However the SET_1 and SET_2 inputs allow the user the flexibility to adjust the current to the maximum allowable output current to increase panel brightness at the expense of some reduced lamp life.
- Although the SET pins are designed such that just leaving them open or grounding them is all that is needed to set the output current, they can also be actively set. Using an open collector or open drain logic signal will allow you to reduce the lamp current for situations where greater dim range is required, as an example; in nighttime situations. In conjunction with a light sensor or other timer the panel could be set to higher brightness (maximum output current) for daytime illumination and lower brightness (minimum or typical output current) at nighttime. Since the dim ratio is a factor of both the burst duty cycle and the peak output current, using this technique the effective dim ratio can be increased greater than the burst duty cycle alone. Conversely, the SET inputs could be used to overdrive the lamp temporarily to facilitate faster lamp warm up at initial lamp turn on. Of course any possible degradation on lamp life from such practices is the users responsibility since not all lamps are designed to be overdriven.
- The inverter has a built in fault timeout function. If the output return is open (lamp disconnected or broken) or shorted the inverter will attempt to strike the lamp for several seconds. After about a second without success the inverter will shutdown. In order to restart the inverter it is necessary to toggle the sleep input or cycle the VIN1 input supply. In the timeout shutdown mode input drain current will be about 8mA.

NOTES