Data Sheet
May 2001

LG1627BXC Clocked Laser Driver

Features

- High data-rate clocked laser diode driver
- Clock disable mode for data feedthrough
- Adjustable high output current
- Operation up to 3 Gbits/s

Applications

- SONET/SDH transmission systems
- SONET/SDH test equipment
- Optical transmitters

Functional Description

The LG1627BXC is a gallium arsenide (GaAs) laser diode driver to be used with direct modulated laser diodes in high-speed non-return-to-zero (NRZ) transmission systems. The device is made in a high-performance 0.9 µm gate GaAs hetero-junction FET technology that utilizes high-density MIM capacitors, airbridge interconnect, and NiCr film precision resistors. The driver includes differential data and clock inputs. The high-output, low overshoot drive current and prebias can be set separately. Data retiming is accomplished by the internal flip-flop, minimizing jitter on the data. Clocking can be disabled for data feedthrough. A pulse-width control enables the user to compensate for laser turn-on delay. A 2.5 V bandgap reference is required for stable operation over temperature and varying power supply voltage.

Functional Diagram

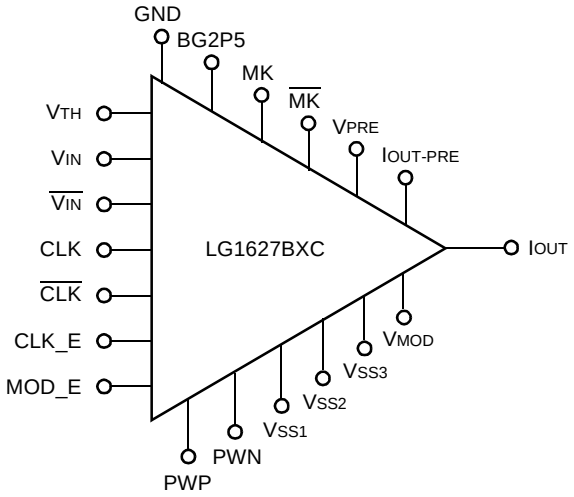

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Figure 1. Functional Diagram

Block Diagram

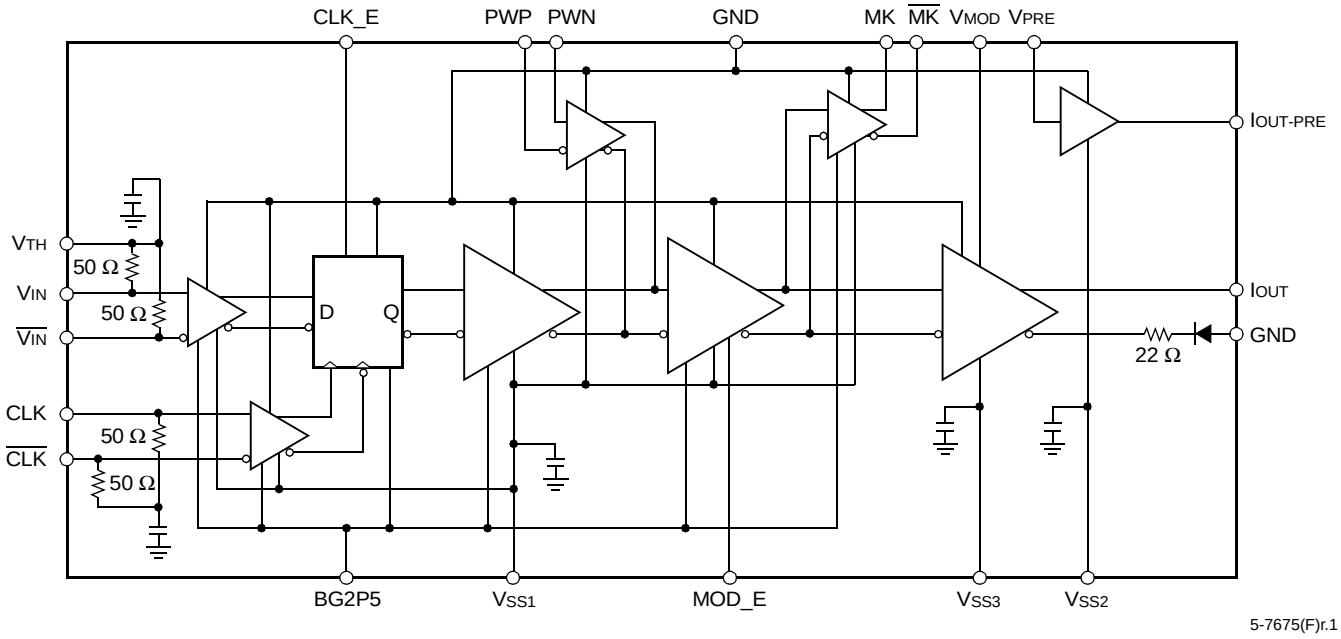

Figure 2. Block Diagram

Pin Information

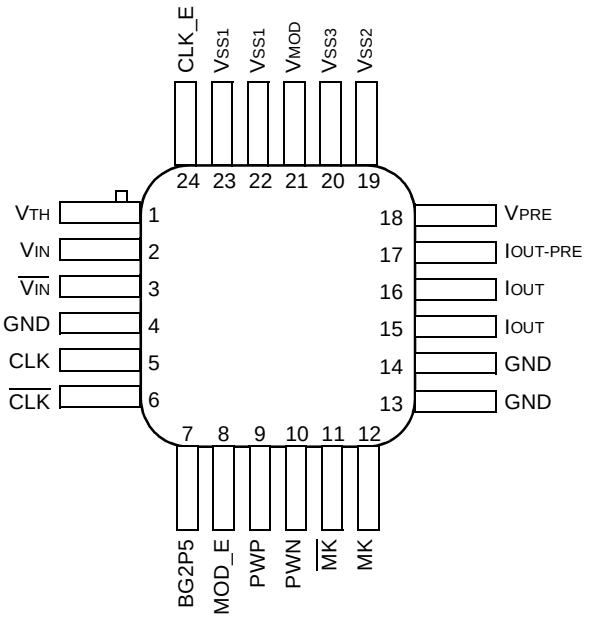

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Figure 3. Pin Diagram

Table 1. Pin Descriptions

Pin	Symbol	Description
1	V_{TH}	Capacitor to ground (data input reference).
2	V_{IN}	Data input.
3	$\overline{V_{IN}}$	Complementary data input.
4, 13, 14, package bottom	GND	Ground. For optimum performance, the package bottom must be soldered to the ground plane.
5	CLK	Clock input.
6	$\overline{CLK}$	Complementary clock input.
7	BG2P5	−2.5 V band-gap reference (*National Semiconductor** p/n LM4040).
8	MOD_E	Modulation enable (connect to V_{SS1} to enable, float to disable).
9	PWP	Pulse width adjust positive.
10	PWN	Pulse width adjust negative.
11	$\overline{MK}$	Complementary mark density output.
12	MK	Mark density output.
15, 16	I_{OUT}	Output modulation current (dc coupled to laser cathode).
17	$I_{OUT-PRE}$	Output prebias current.
18	V_{PRE}	Prebias control input.
19	V_{SS2}	V_{SS2} supply −5.2 V for output prebias.
20	V_{SS3}	V_{SS3} supply −5.2 V for output modulation.
21	V_{MOD}	Modulation current control input.
22, 23	V_{SS1}	V_{SS1} supply −5.2 V.
24	CLK_E	Clock enable (connect to V_{SS1} to enable, float to disable).

* *National Semiconductor* is a registered trademark of National Semiconductor Corporation.

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Table 2. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{SS}	—	–5.7	V
Input Voltage	V_I	GND	V_{SS}	V
Power Dissipation	P_D	—	1	W
Storage Temperature	T_{stg}	–40	125	°C
Operating Case Temperature Range	T_C	0	100	°C

Recommended Operating Conditions

Table 3. Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Case Temperature	t_{CASE}	0	70	°C
Power Supply	V_{SS}	–4.7	–5.7	V

Handling Precautions

Although protection circuitry has been designed into this device, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. Lucent employs a human-body model (HBM) and a charged-device model (CDM) for ESD-susceptibility testing and protection design evaluation. ESD voltage thresholds are dependent on the circuit parameters used to define the model. No industry-wide standard has been adopted for the CDM. However, a standard HBM (resistance = 1500 Ω, capacitance = 100 pF) is widely used and, therefore, can be used for comparison. The HBM ESD threshold presented here was obtained by using these circuit parameters.

Table 4. ESD Threshold Voltage

Human-Body Model ESD Threshold	
Device	**Voltage**
LG1627BXC	>200

Mounting and Connections

Certain precautions must be taken when using solder. For installation using a constant temperature solder, temperatures of under 300 °C may be employed for periods of time up to 5 seconds, maximum. For installation with a soldering iron (battery operated or nonswitching only), the soldering tip temperature should not be greater than 300 °C and the soldering time for each lead must not exceed 5 seconds. This device is supplied with solder on the back of the package. For optimum performance, it is recommended to solder the back of the package to ground.

Electrical Characteristics (T_A = 25 °C, V_{SS1} = V_{SS2} = V_{SS3} = –5.2 V, data input = 600 mV (single ended), and R_L = 50 Ω)

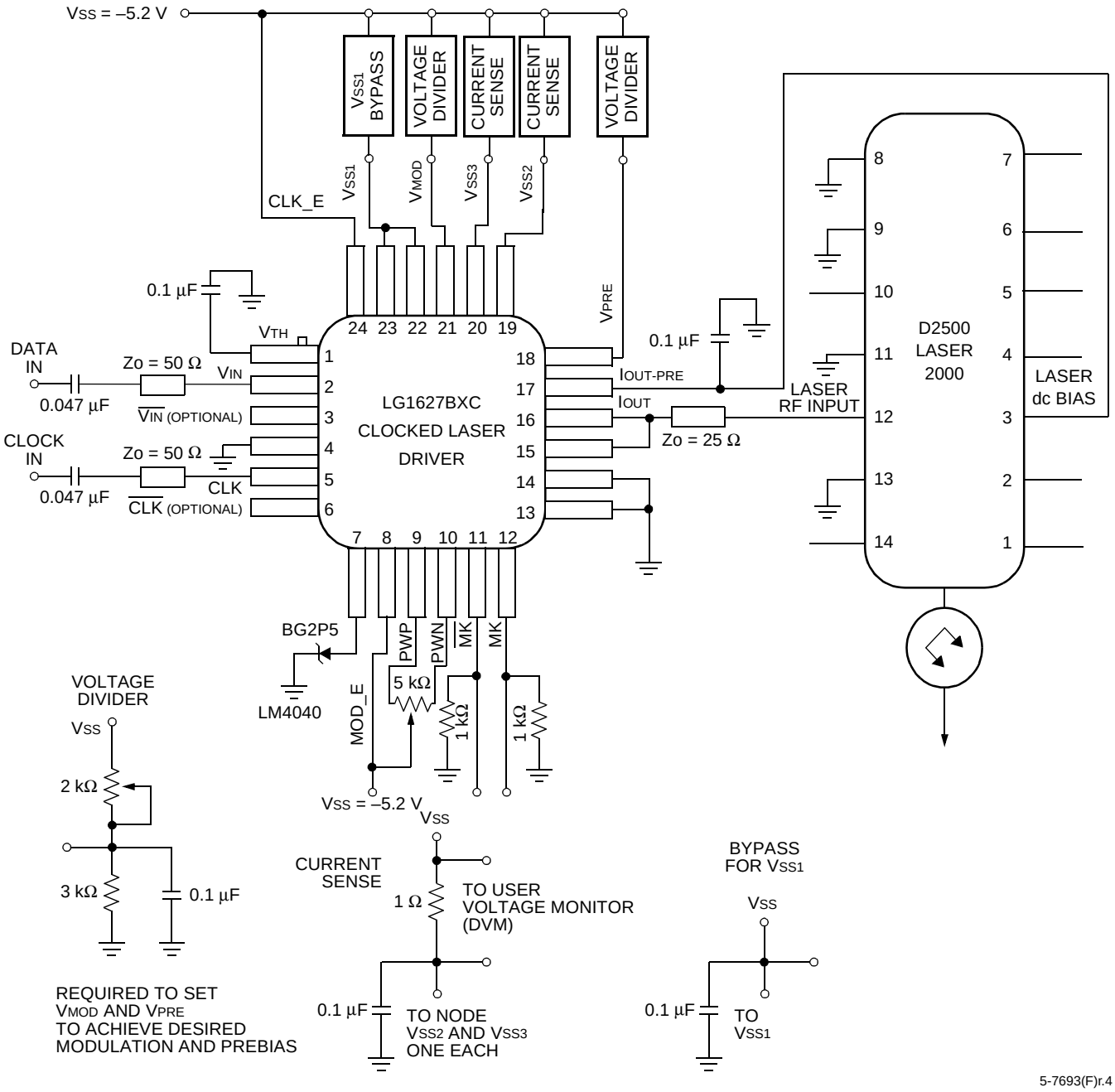
Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information purposes only and are not part of the testing requirements. Stresses in excess of the absolute maximum ratings can cause permanent damage to the device.

Table 5. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Data Input Voltage, Single Ended	V_{IN}	300	600	1000	mV
Power Supply Voltage	V_{SS1}, V_{SS2}, V_{SS3}	–4.9	–5.2	–5.5	V
Power Supply Current[1]	I_{SS1}	100	140	160	mA
Voltage Control for Output Modulation Current	V_{MOD}	–4.0	—	–5.5	V
Output Minimum Modulation Current	$I_{OUT\ LOW}$	—	0	2	mA
Output Maximum Modulation Current[2]	$I_{OUT\ HIGH}$	75	85	—	mA
Voltage Control for Prebias Current	V_{PRE}	–3.0	—	–5.5	V
Output Minimum Prebias Current	$I_{PRE\ LOW}$	—	0	0.5	mA
Output Maximum Prebias Current[3]	$I_{PRE\ HIGH}$	50	60	—	mA
Mark Density, 50% Duty Cycle (1 kΩ to GND)	MK	—	–0.5	—	V
Mark Density Complement, 50% Duty Cycle (1 kΩ to GND)	$\overline{MK}$	—	–0.5	—	V
Pulse Width Adjust Plus	PWP	–3.0	–4.2	–5.5	V
Pulse Width Adjust Negative	PWN	–3.0	–4.2	–5.5	V
Output Modulation I_{OUT} = 40 mA, Clock Enabled					
Output Rise and Fall Times (20%—80%)	t_R, t_F	—	90	—	ps
Jitter (rms)	—	—	4	—	ps
Phase Margin	—	—	270	—	deg
Output Modulation I_{OUT} = 40 mA, Clock Disabled					
Output Rise and Fall Times (20%—80%)	t_R, t_F	—	90	—	ps
Jitter (rms)	—	—	6	—	ps
Output Modulation I_{OUT} = 80 mA, Clock Enabled					
Output Rise and Fall Times (20%—80%)	t_R, t_F	—	100	—	ps
Jitter (rms)	—	—	4	—	ps
Phase Margin	—	—	270	—	deg
Output Modulation I_{OUT} = 80 mA, Clock Disabled					
Output Rise and Fall Times (20%—80%)	t_R, t_F	—	100	—	ps
Jitter (rms)	—	—	6	—	ps

1. Excludes I_{PRE} and average I_{MOD}.
   Power supply current I_{SS2} (relating to prebias) is dependent on V_{PRE}.
   Power supply current I_{SS3} (relating to modulation) is dependent on V_{MOD}.
2. Maximum modulation at maximum V_{MOD}.
3. Maximum prebias at maximum V_{PRE}.

Typical Optical Evaluations and Performance Characteristics



Notes:
All bypass capacitors should be mounted close to the package.

For optimum performance, the package must be soldered to ground.

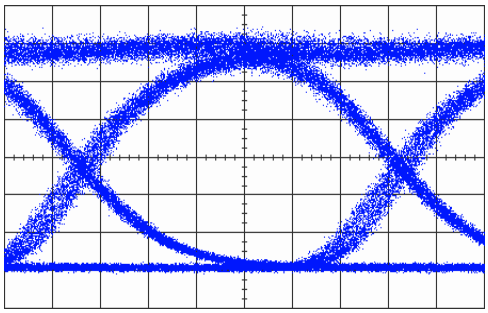
Mark density (MK and $\overline{MK}$) outputs are terminated with 1 kΩ pull-up resistors.

For single-ended operation, unused data and clock inputs should be ac coupled to a 50 Ω termination.

Pin 13 and pin 14 should be tied together with a separate path to the ground plane.

Figure 4. Typical Optical Evaluation of the LG1627BXC and D2500 Laser

Typical Optical Evaluations and Performance Characteristics (continued)



HORIZONTAL: 60 ps/div, VERTICAL: 1.5 mW/div

Figure 5. Typical Optical Eye-Diagram I_{OUT} = 85 mA; $I_{OUT-PRE}$ = 5 mA

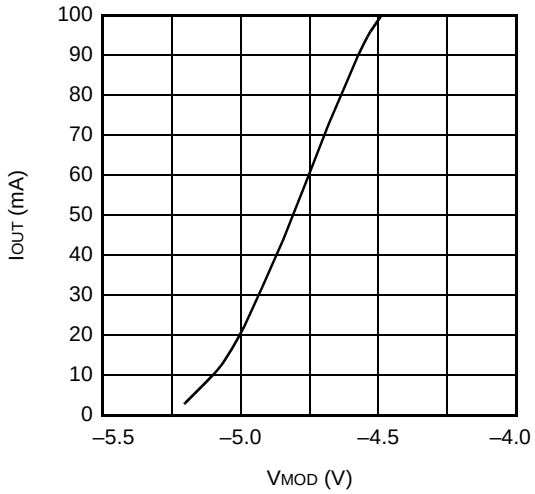


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Figure 6. Typical I_{OUT} vs. V_{MOD}

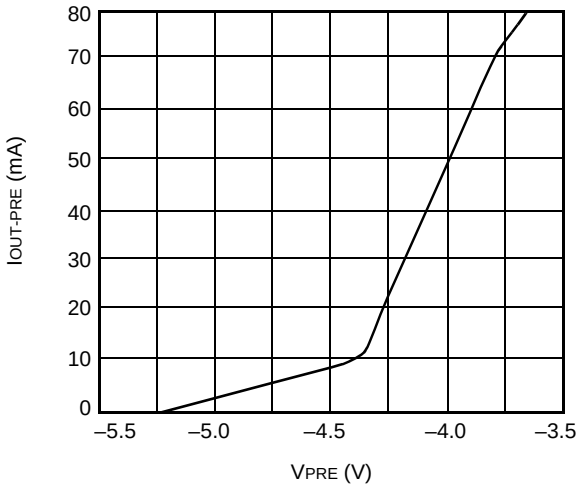

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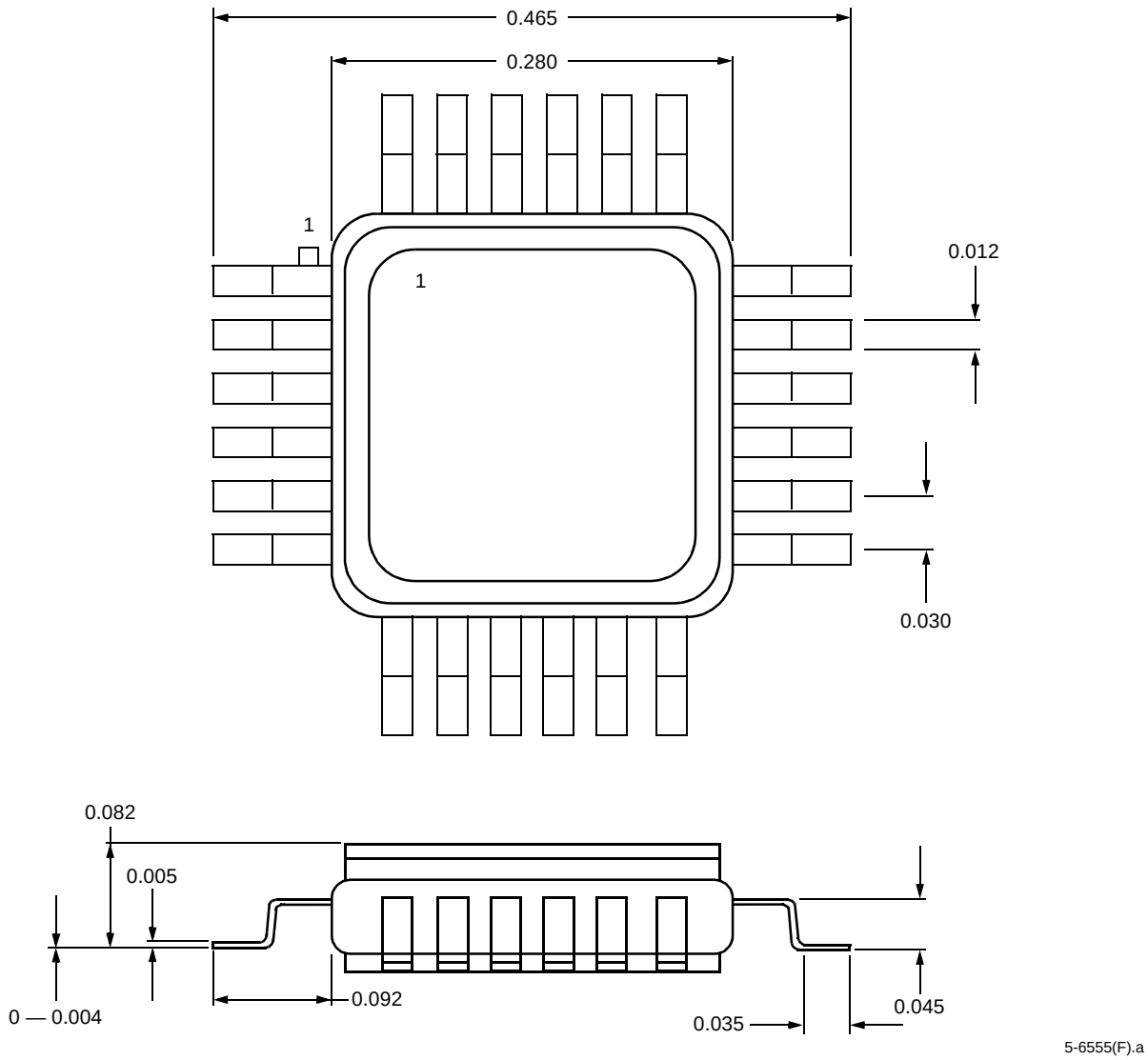
Figure 7. Typical $I_{OUT-PRE}$ vs. V_{PRE}

Outline Diagram



Assembly Notes:

Standoff specifications apply to package prior to solder dipping of leads and package base.

During board assembly, use back lighting to silhouette the package. This will eliminate reflection problems with the solder on the bottom of the package.

Lead space tolerance should be set to ±0.012”.

Board solder pattern for the package base should not exceed 50% of the package base area.

Insertion pressure should not exceed 125 grams.

Ordering Information

Device Code	Package	Temperature	Comcode (Ordering Number)
LG1627BXC	24-pin hermetic small outline	0 °C to 70 °C	108325754

Notes

For additional information, contact your Agere Systems Account Manager or the following:
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