Preliminary Data Sheet

VSC7925

SONET/SDH 2.5Gb/s Laser Diode Driver

Features

- Rise Times Less Than 100ps
- High Speed Operation (Up to 2.5Gb/s NRZ Data)
- Single-ended Inputs
- Single Supply
- Direct Access to Modulation and Bias FET's
- Data Density Monitors
- On-Chip Reclocking Register
- 24-Pin Ceramic Package

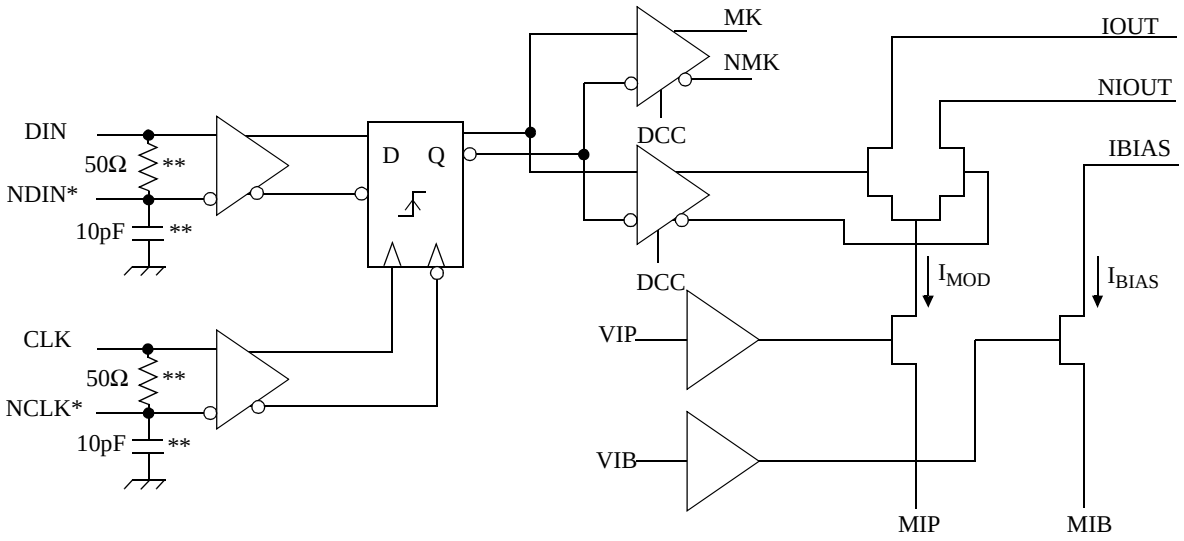
Applications

- SONET/SDH at 622Mb/s, 1.244Gb/s, and 2.488Gb/s
- Full-Speed Fibre Channel (1.062Gb/s)

General Description

The VSC7925 is a single 5V supply, 2.5Gb/s laser diode driver with direct access to the laser modulation and bias FETs. Laser bias and modulation currents are set by external components allowing precision monitoring and setting of the current levels. Data density outputs are provided to allow the user to adjust the laser bias in unbalanced data applications. Clock and data inputs have nominal 50Ω termination resistors and high frequency decoupling capacitors.P

VSC7925 Block Diagram



* Terminated to off-chip capacitor
** On-die components

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Table 1: Signal Pin Reference

Signal	*Type*	*Level*	*# Pins*	*Description*
DIN, NDIN	In		2	Data Input and Data Reference
MK, NMK	Out	ECL	2	Data Density Differential Outputs
NIOUT	Out		1	Laser Modulation Current Output (Complementary)
IOUT	Out		1	Laser Modulation Current Output (To Laser Cathode)
VSS	Pwr	Pwr	4	Negative Voltage Rail
GND	Pwr	Pwr	6	Positive Voltage Rail
VIP	In	DC	1	Modulation Gate Node
MIP	In	DC	1	Modulation Source Node
VIB	In	DC	1	Bias Gate Node
MIB	In	DC	1	Bias Source Node
IBIAS	Out	DC	1	Laser Bias Output (To Laser Cathode)
CLK, NCLK	In		2	Clock Input and Clock Reference
DCC	In	DC	1	Duty Cycle Control, Leave Floating
Total Pins			24	

Table 2: Absolute Maximum Ratings

Symbol	*Rating*	*Limit*
V_{SS}	Negative Power Supply Voltage	V_{CC} to -6.0V
T_J	Maximum Junction Temperature	-55°C to + 125°C
T_{STG}	Storage Temperature	-65°C to +150°C

Table 3: High-Speed Inputs and ECL Outputs

Symbol	*Parameter*	*Min*	*Typ*	*Max*	*Units*	*Conditions*
V_{IN}	Single-ended Input Voltage Swing	300		1500	mV	V_{CM} = -2.5V
V_{CM}	Differential Input Common Mode Range	-3.3		-1.3	V	V_{SS} = -5.2V
V_{OH}	ECL Output High Voltage	-1200		-500	mV	50Ω to -2.0V
V_{OL}	ECL Output Low Voltage	-2000		-1600	mV	50Ω to -2.0V

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Table 4: Recommended Operating Conditions

Symbol	*Parameter*	*Min*	*Typ*	*Max*	*Units*	*Conditions*
GND	Positive Voltage Rail		0		V	
V_{SS}	Negative Voltage Rail	-5.5	-5.2	-4.9	V	
$T_{CASE\ KF}$	Operational Temperature9.0 pt	-40		85	°C	Power dissipation = 1.3W Ceramic Package

NOTE: (1) Lower limit of specification is ambient temperature and upper limit is case temperature.

Table 5: Power Dissipation

Symbol	*Parameter*	*Min*	*Typ*	*Max*	*Units*	*Conditions*
I_{VSS}	Power Supply Current (V_{SS})			220	mA	$I_{MOD} = I_{BIAS} = 0mA$
P_D	Total Power Dissipation			1200	mW	$V_{SS} = -5.5V$, $I_{MOD} = I_{BIAS} = 0mA$, $R_{LOAD} = 25\Omega$ to GND

Table 6: Laser Driver DC Electrical Specifications

Symbol	*Parameter*	*Min*	*Typ*	*Max*	*Units*	*Conditions*
I_{BIAS}	Programmable Laser Bias Current	2		50	mA	
I_{MOD}	Programmable Modulation Current	2	-	60	mA	
V_{IB}	Laser Bias Control Voltage			V_{SS} + 2.1	V	$I_{BIAS} = 50mA$
V_{IP}	Laser Modulation Control Voltage			V_{SS} + 2.1	V	$I_{MOD} = 60mA$
V_{OCM}	Output Voltage Compliance		GND -2.5V		V	$V_{SS} = -5.2V$

Table 7: Laser Driver AC Electrical Specifications

Symbol	*Parameter*	*Min*	*Typ*	*Max*	*Units*	*Conditions*
t_R, t_F	Output Rise and Fall Times			100	ps	25Ω load, 20%-80%, 15mA < I_{MOD} < 60mA, $I_{BIAS} = 20mA$
t_{SU}	Data to Clock Setup Time		50		ps	
t_H	Hold Time		50		ps	

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Figure 1: Laser Driver Maximum Case Temperature vs. Modulation Current

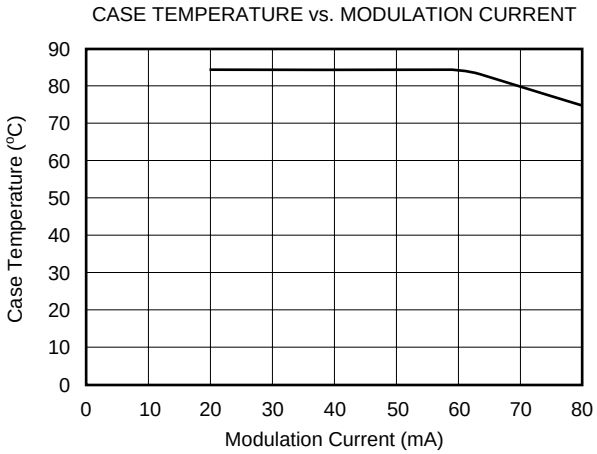


Figure 2: Clock and Data Input Structure

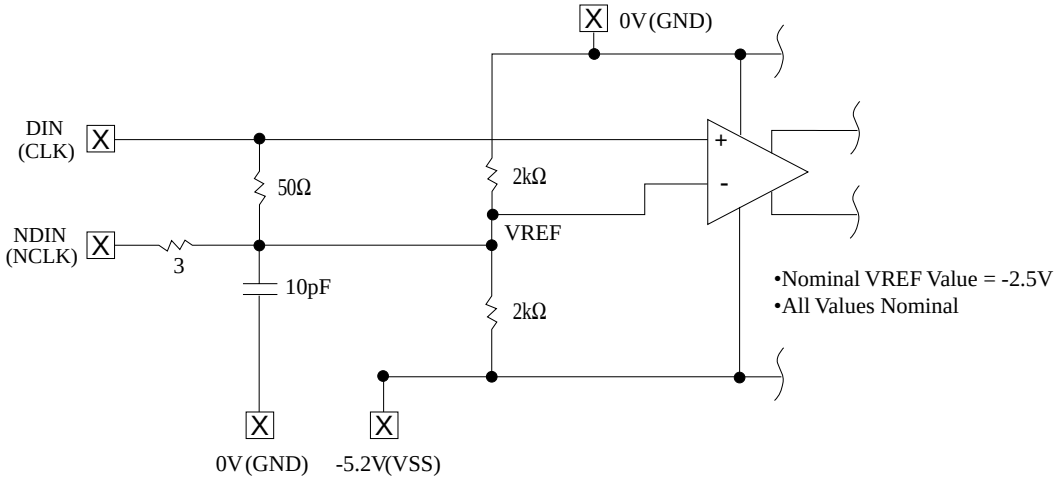
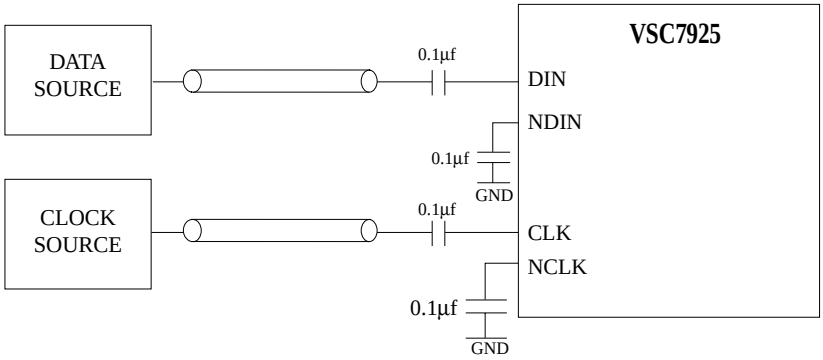
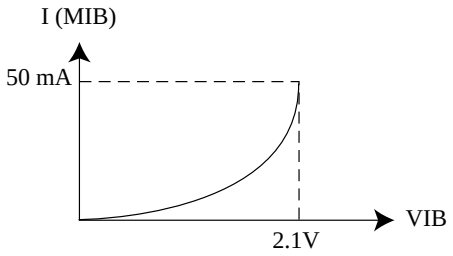


Figure 3: Single-Ended Operation

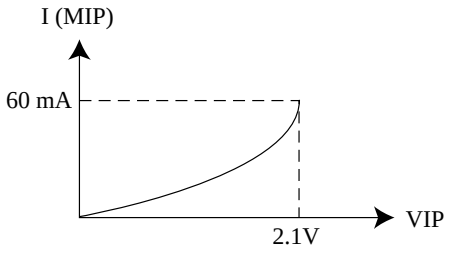


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Figure 4: Control Signals VIP and VIB

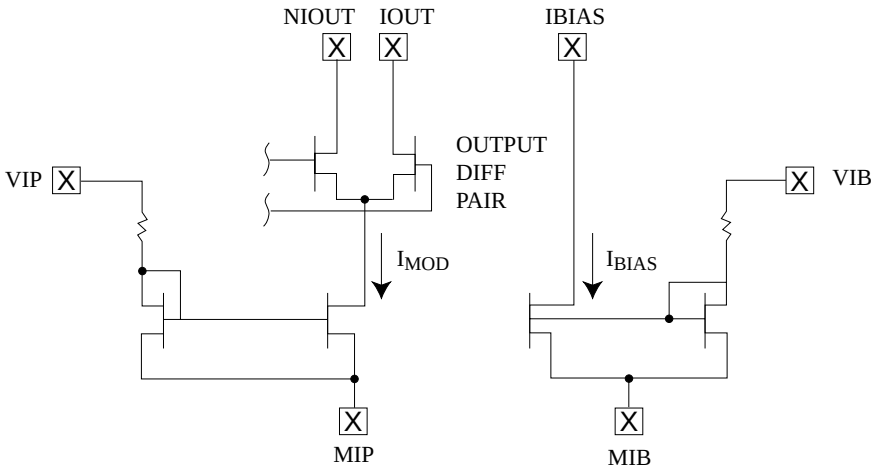


Typical Bias Current v.s. Bias Voltage



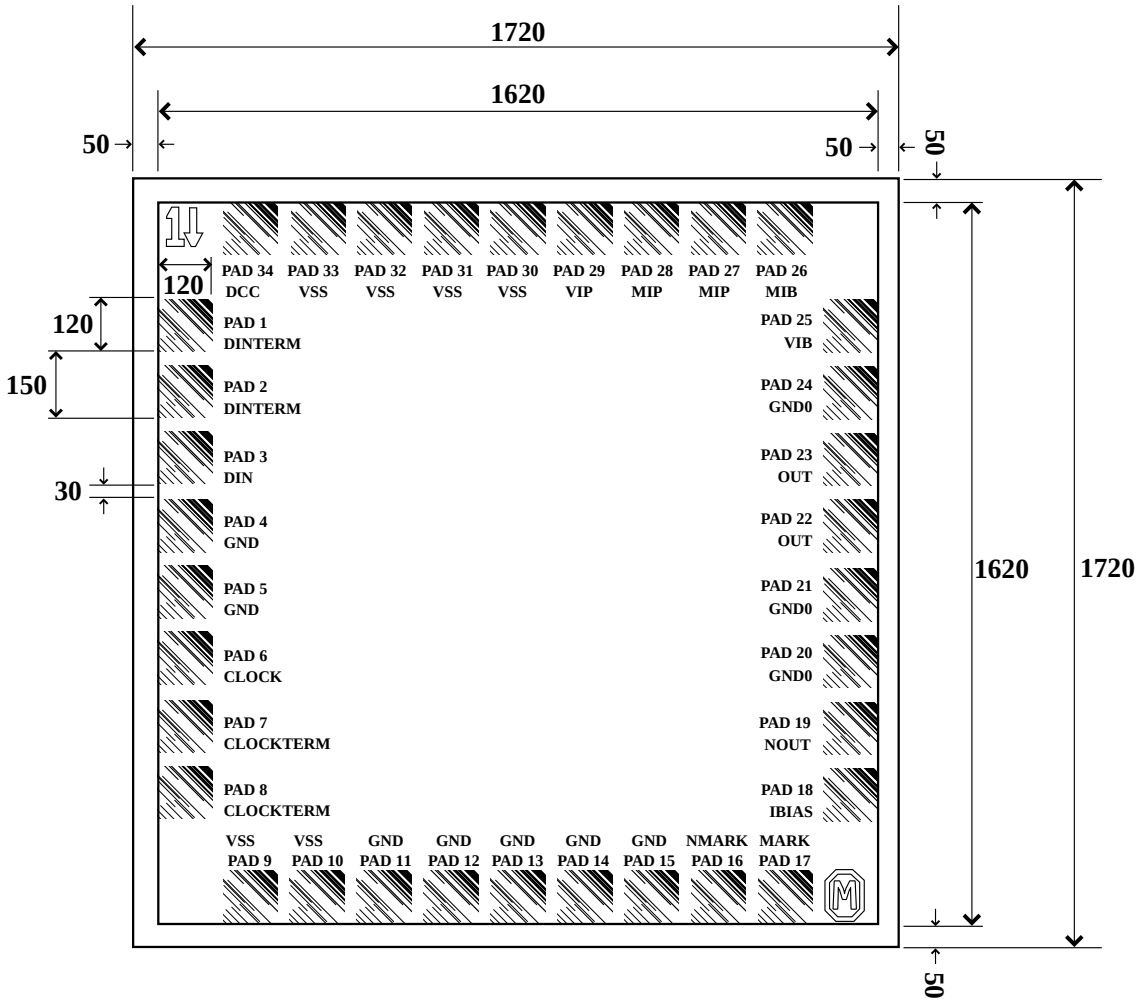
Typical Modulation Current v.s. Modulation Voltage

Figure 5: Simplified Output Structure



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Figure 6: Pad Assignments for VSC7925 Die

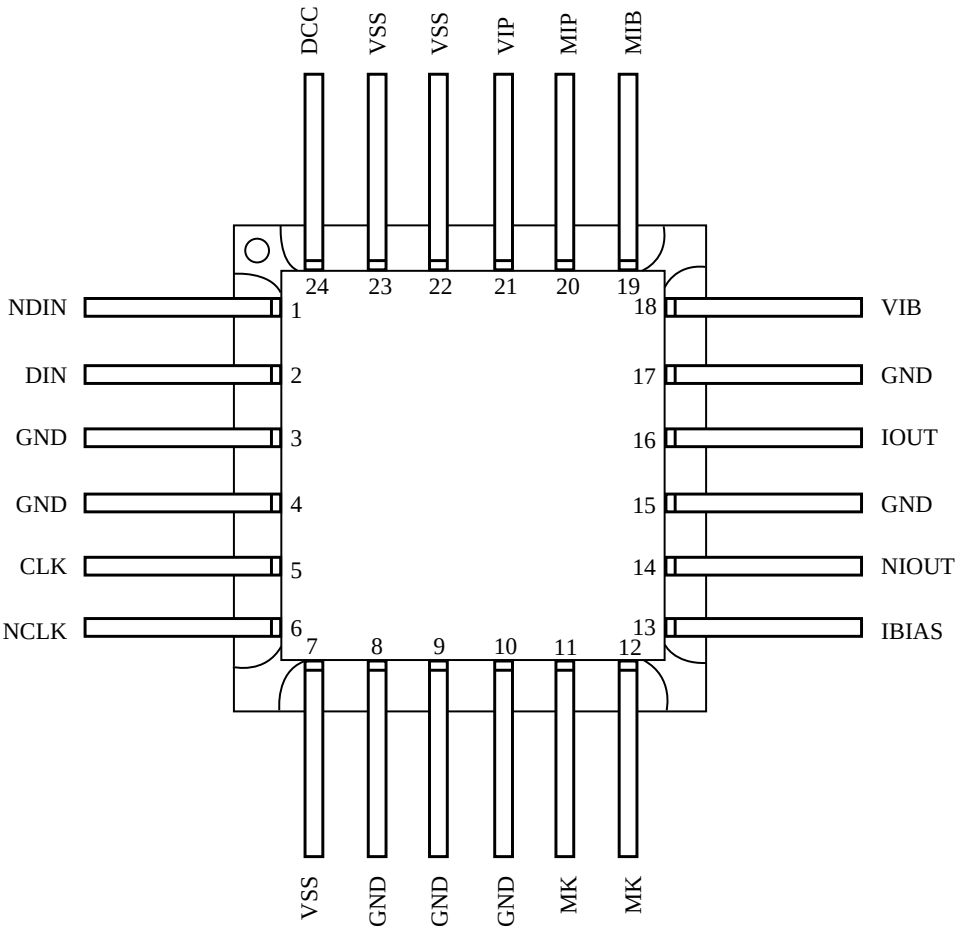


Dimensions in micrometers.

1) Die size = 1620µm x 1620µm
2) Actual die size = 1720µm x 1720µm (after the die are cut up)
3) Pad size = 120µm x 120µm
4) Pad pitch = 150µm
5) Space between pads = 30µm

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Pin Diagram - 24-Pin Ceramic Package

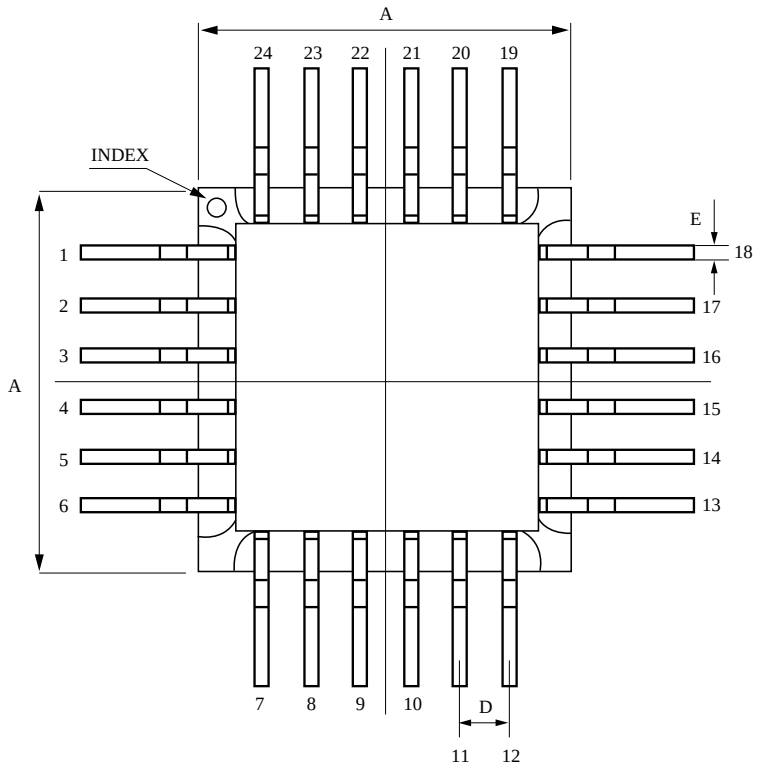


Note: ***Package lid and bottom heat spreader are electrically connected to GND within the package.***

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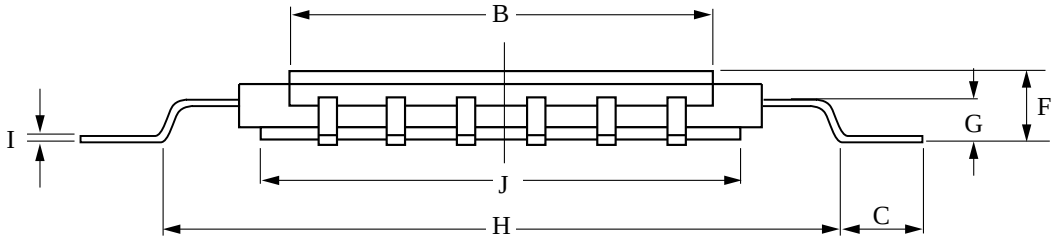
Package Information - 24 Pin Ceramic Package (Formed Leads)

Top View



Key	*mm*	*In*
A	9.5	0.374
B	7.7	0.303
C	2.0	0.079
D	1.27	0.050
E	0.30	0.012
F	1.7	0.067
G	0.6	0.024
H	11.5	0.453
I	0.125	0.005
J	8.51	0.335

Side View

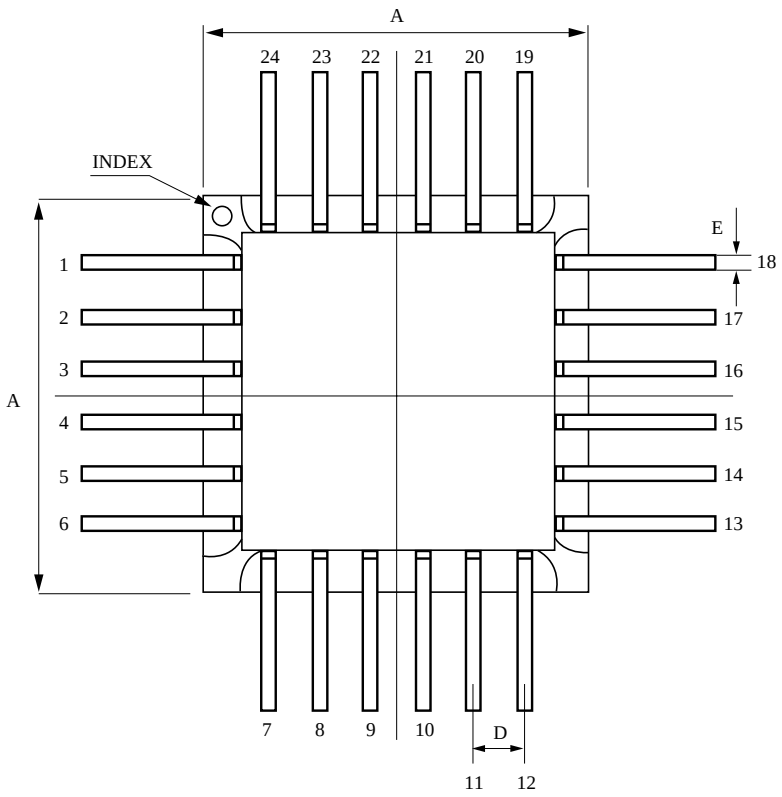


NOTES: Drawing not to scale.
Package #: 101-000-0 Issue #:1

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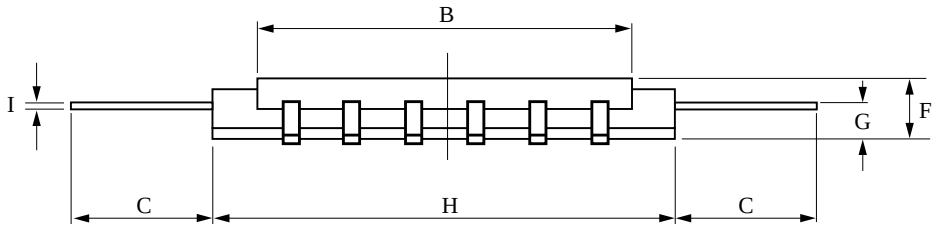
Package Information - 24 Pin Ceramic Package (Straight Leads)

Top View



Key	*mm*	*In*
A	9.5	0.374
B	7.7	0.303
C	5.8	.230
D	1.27	0.050
E	0.30	0.012
F	1.7	0.067
G	0.6	0.024
H	9.53	0.375
I	0.125	0.005
J	8.51	0.335

Side View



NOTES: Drawing not to scale.
Package #: 101-000-0 Issue #:1

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Ordering Information

The order number for this product is formed by a combination of the device number, and package style.

VSC7925 **XX**

Device Type
VSC7925: 2.5Gb/s Laser Diode Driver

Package Style
KF: (Ceramic - Straight Leads)
KFL: (Ceramic- Formed Leads)

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