September 16, 2010
ODHKGL4145KW-07

Electronic Components

KGL4145KW Series

11.3 Gbps EA Modulator Driver IC

FEATURES

- Input Interface : CML Compatible/AC Couple
- High Sensitive Input : 0.35 Vpp (Single-ended)
- Wide Output Amplitude Control : 1.0 Vpp to 3.0 Vpp
- X-Point Controllability : 35 % to 80 %
- Maximum Output Offset : 1.2V (@ 50Ω)

APPLICATIONS

- SONET OC-192 and SDH STM-64 Transmission Systems up to 11.3 Gbps
- 10GBE Systems
- DWDM Systems
- Optical Transmitters/Transceivers/Transponders
- SONET/SDH Test Equipment

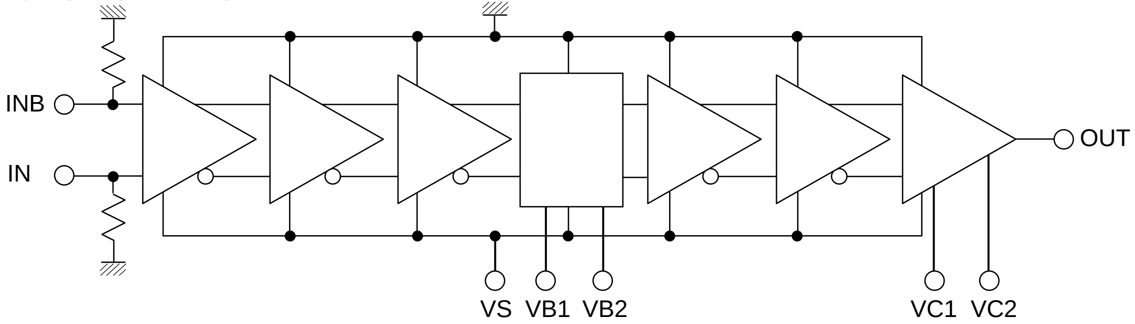
GENERAL DESCRIPTION

The KGL4145KW is a high performance electroabsorption modulator and direct modulated LASER diode driver for SONET/SDH and 10GBE applications up to 11.3Gb/s. The device provides typically 3Vpp single-ended output, output amplitude control, output offset control, and duty cycle (X-Point) control.

The KGL4145KW data input accepts single ended or differential AC-coupled signals, or differential DC-coupled signals. The output amplitude can be tuned from 1.0Vpp to 3.0Vpp by varying VC1. The output bias can be tuned over 1.0V by varying VC2.
The KGL4145KW is capable of adjusting the crossing point (X-point) from 35% to 80% of the output eye diagram via the differential voltage between VB1 and VB2

The KGL4145KW is packaged in a small 24-pin QFN Package : 4x4mm

FUNCTION DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	Note
Supply Voltage	VS	-6.5	0.3	V	
X-Point Control Voltage	VB1	VS-5.0 (Min. -6.5)	VS+3.0 (Max. 0.3)	V	
X-Point Reference Voltage	VB2	VS-5.0 (Min. -6.5)	VS+3.0 (Max. 0.3)	V	
Output Amplitude Control Voltage	VC1	-6.5	VS+1.6 (Max. 0.3)	V	
Output Bias Control Voltage	VC2	-6.5	VS+2.6 (Max. 0.3)	V	
Input Voltage	Vin(DC)	-2	0.6	V	DC coupled
Input Amplitude	Vin	-	1.5	Vpp	AC coupled
Operating Temperature at Package Base	Ts	-10	100	°C	
Storage Temperature	Tst	-40	125	°C	

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit	Note
Supply Voltage	VS	-5.46	-5.2	-4.94	V	
X-Point Control Voltage	VB1	VS+0.4	-	VS+1.8	V	
X-Point Reference Voltage	VB2 [1)]	-4.2	-3.95	-3.7	V	
Output Amplitude Control Voltage	VC1	VS	-	VS+1.2	V	
Output Bias Control Voltage	VC2	VS	-	VS+2.4	V	
Input High Voltage	VHin	-0.2	-	0	V	DC coupled
Single-ended Input Amplitude	Vin	0.35	-	1.2	Vpp	AC coupled
Differential Input Amplitude		0.175	-	1.2	Vpp	DC/AC coupled
Operating Temperature at Package Base	Ts	0	-	85	°C	
Input Interface	DC coupled(CML) or AC coupled (External blocking capacitor is required) [2)]					
Output Interface	DC coupled					

1) VB2 can be open or biased by the external circuit.
For VB2 opened, VB2 is biased at about -3.952V (VS=-5.2V).

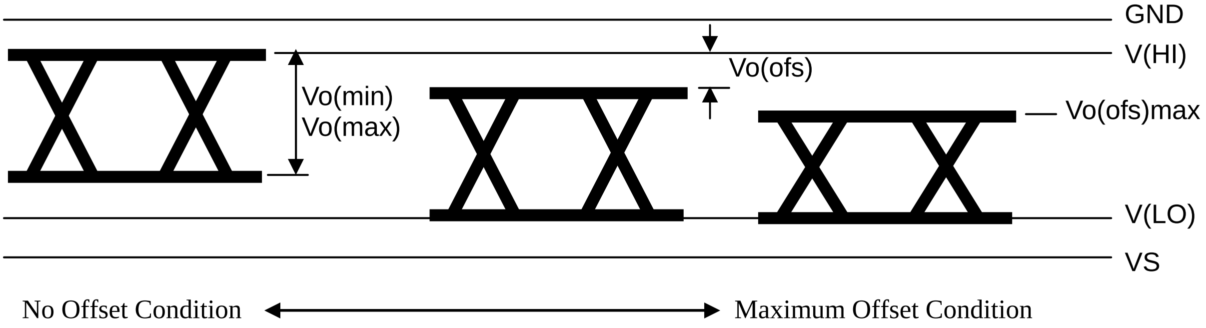
2) For DC coupled, input must be differential.
For AC coupled, differential or single-ended inputs are available.

ELECTRICAL CHARACTERISTICS

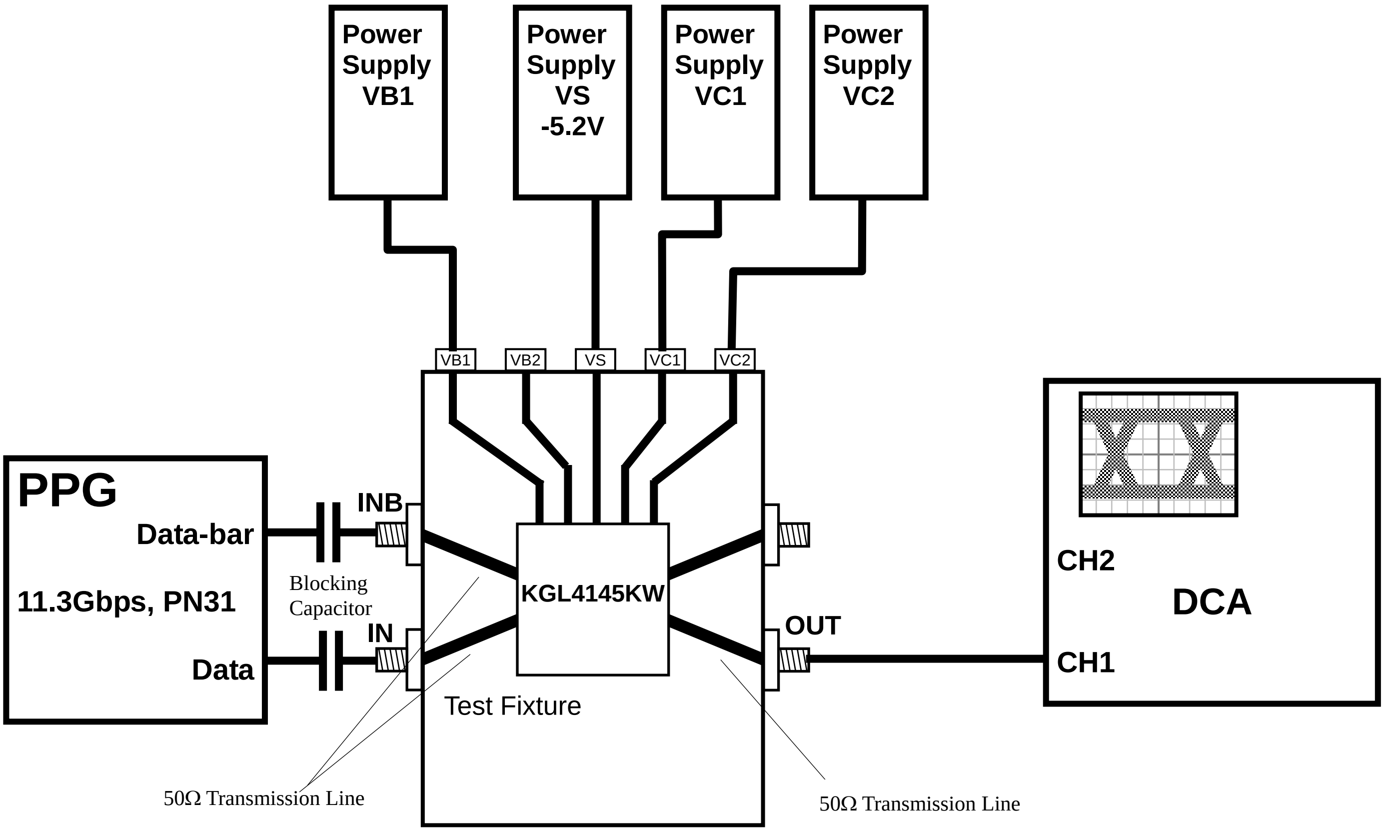
Typical values are at VS=-5.2V, Ts=25°C.

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Maximum Input Data Rate			NRZ	11.3			Gbps
Supply Current		Iss	minimum amplitude, no offset (VC1=VC2=VS)	-	150	175	mA
			maximum Amplitude, no offset (VC1=VS+1.2V,VC2=VS)	-	220	-	mA
			maximum Amplitude, maximum offset (VC1=VS+1.2V, VC2=VS+2.4V)	-	270	-	mA
Power consumption		Pwr	50 Ω load,Vs=-5.2V Output amplitude=2.5Vpp Outpuut high Level=-1.0V	-	1.2	-	W
Output Amplitude (Min)		Vo (Min)	50 Ω load	-	1	1.2	Vpp
Output Amplitude (Max)		Vo (Max)	50 Ω load	2.7	3	-	Vpp
Output High Voltage		V (HI) 1)	50 Ω load no offset	-0.5	-	0	V
Maximum Output High Voltage Offset		Vo(ofs)max 1)	50 Ω load	1.0	1.2	-	V
Output Low Voltage		V (LO)	50 Ω load, maximum amplitude, maximum offset	-	-	-3.3	V
X-Point Control Range	High	XPH	50 Ω load, NRZ	75	80		%
	Low	XPL		-	35	40	%
X-Point Stability		Del (Xp)	50 Ω load, 0–85°C	-	-	10	%
Output Rise/Fall Time		Tr/Tf	50 Ω load, 20%/80%	-	26	40	ps
Input Return Loss		S11	100kHz–10 GHz	-	12	-	dB

1) Output high voltage with offset control is defined by “ V(HI) – Vo(ofs) “.

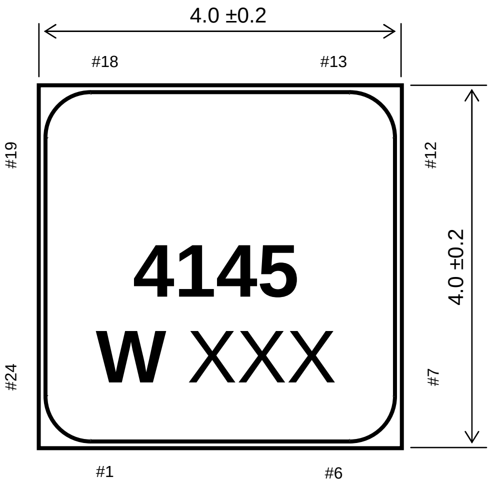


AC CHARACTERISTICS TEST CIRCUIT

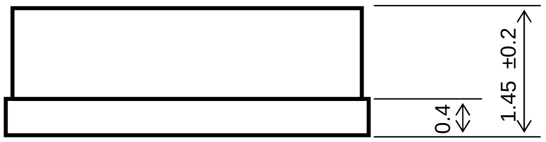


PACKAGE DIMENSIONS

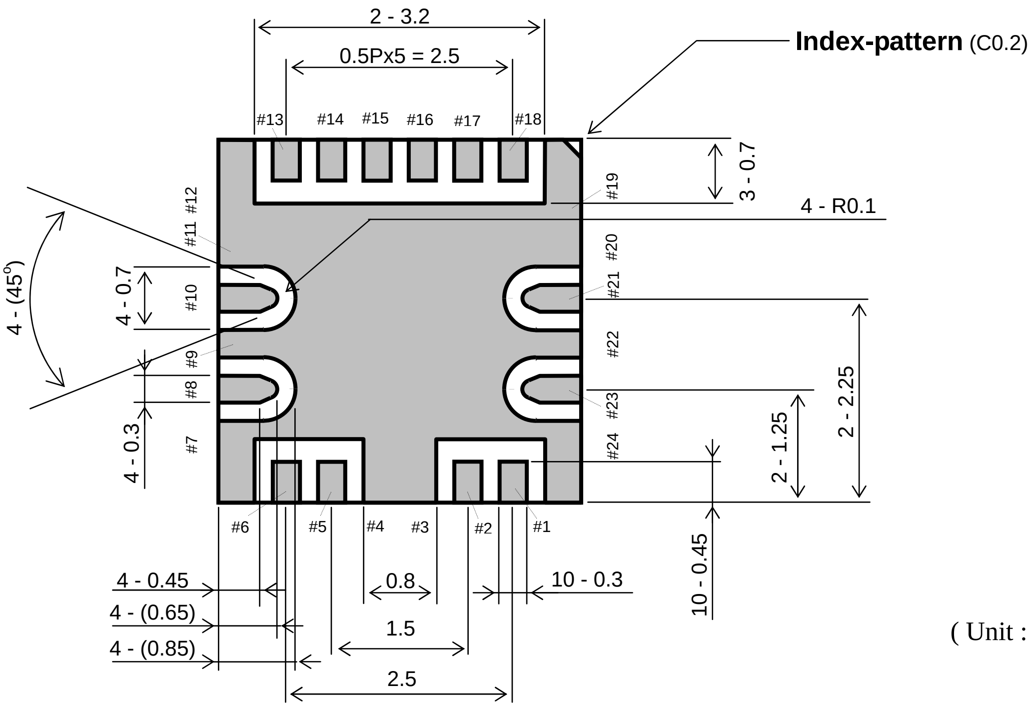
(Top View)



(Side View)



(Bottom View)



(Unit : mm)

Note : This package is non-hermetic.

PIN CONNECTION

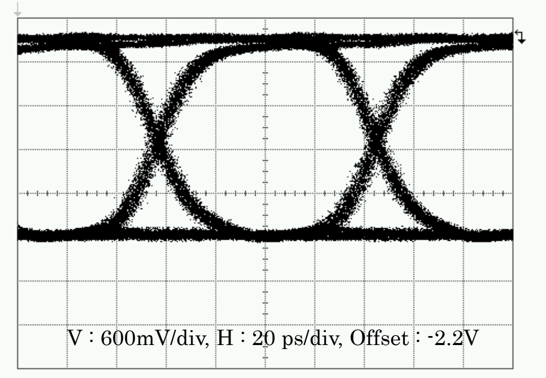
No.	Symbol	Note
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	OUT	Output Port
9	GND	Ground
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	VC2	Output Bias Control Port
14	VC1	Output Amplitude Control Port
15	VS	Supply Voltage Port
16	VS	Supply Voltage Port
17	VB2	X-Point Reference Port
18	VB1	X-Point Control Port
19	GND	Ground
20	GND	Ground
21	INB	Inverted Input Port
22	GND	Ground
23	IN	Signal Input Port
24	GND	Ground

TYPICAL OPERATING CHARACTERISTICS

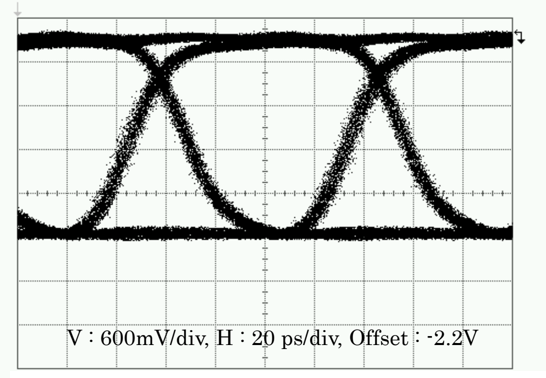
Measured Condition

Input Signal 11.3Gbps, NRZ, PN31, Differential 0.35Vpp, AC Coupled
Tr/Tf(20-80%) ≅36ps (through 7.5GHz Bessel Filters)

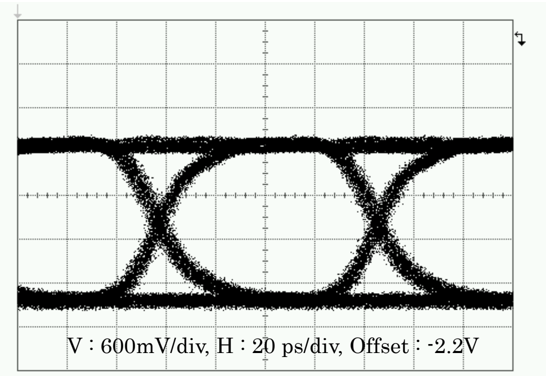
Waveforms @11.3Gbps Operate



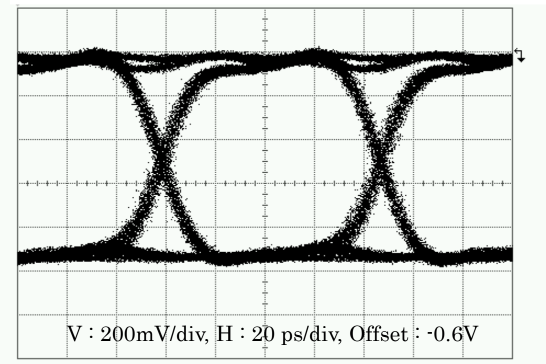
Vs : -5.2V Is : 196.0mA
Vb1 : -3.843V Crossing-Point : 49.3%
Vc1 : -4.4V
Vc2 : -5.2V
Amplitude : 2.65Vpp
High Level: -0.146V
Tr : 21.3ps
Tf : 21.8ps
JitterP-P : 8.9ps



Vs : -5.2V Is : 195.6mA
Vb1 : -4.115V Crossing-Point : 81.0%
Vc1 : -4.4V
Vc2 : -5.2V
Amplitude : 2.62Vpp
High Level: -0.117V
Tr : 20.9ps
Tf : 22.2ps
JitterP-P : 11.1ps

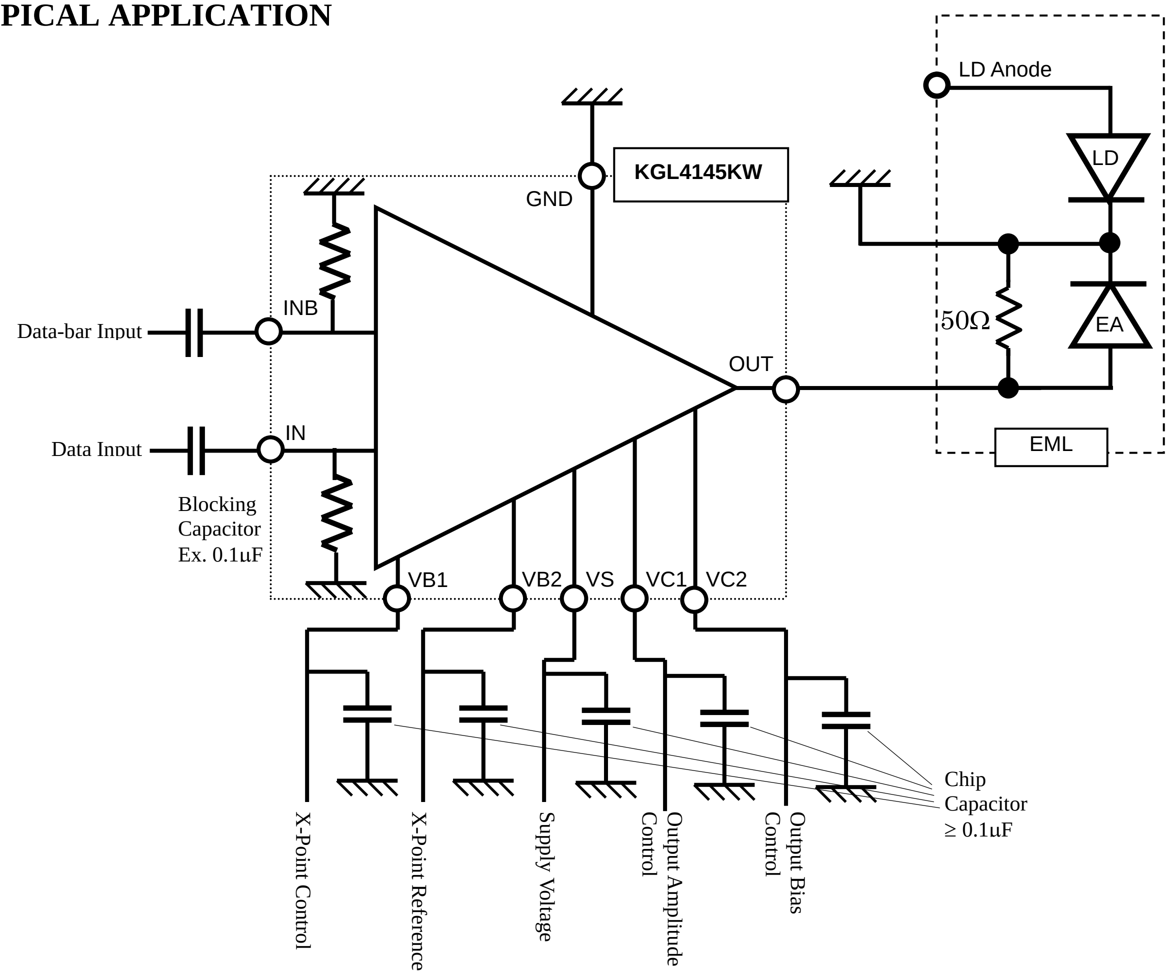


Vs : -5.2V Is : 237.1mA
Vb1 : -3.897V Crossing-Point : 49.8%
Vc1 : -4.4V
Vc2 : -2.8V
Amplitude : 2.11Vpp
High Level: -1.525V
Tr : 20.0ps
Tf : 22.2ps
JitterP-P : 9.8ps



Vs : -5.2V Is : 134.2mA
Vb1 : -3.850V Crossing-Point : 49.3%
Vc1 : -5.2V
Vc2 : -5.2V
Amplitude : 0.88Vpp
High Level: -0.053V
Tr : 18.7ps
Tf : 17.3ps
JitterP-P : 8.0ps

TYPICAL APPLICATION



TYPICAL PCB LAYOUT AND ASSEMBLING INFORMATION

Please request us the application note named GTD18791.

ORDERING INFORMATION

1. KGL4145KW : Packed into 121pc tray. (Please request us the information of packing named GTD18808.)
2. KGL4145KW-L : Packed into 490pc tray.(Please request us the information of packing named GTD19096.)

APPLICATION NOTE

1. For stable operation;
   - a) To prevent a dependence of “X-Point” on the supply voltage VS,
     - Case 1 : VB2 is open
       - VB2 is biased at about 0.76 x VS (3.952V@VS=-5.2V) by the internal circuit.
       - Control VB1, so that the voltage difference “VB1–VB2” is constant.
     - Case 2 : VB2 is biased
       - Bias VB2 at about –3.8V by using the external voltage source independent of VS.
       - Control VB1 by using the external voltage source independent of VS.
   - b) To prevent a dependence of “Output amplitude” on the supply voltage VS
     Control the voltage of “VC1”, so that the voltage difference “VC1–VS” is constant.
   - c) To prevent a dependence of “Output high voltage offset” on the supply voltage VS
     Control the voltage of “VC2”, so that the voltage difference “VC2–VS” is constant.

2. Power-up/shut-down sequence;
   - a) For manual power-up, turn on supply control voltages (VB1, VB2, VC1, VC2) at first, then VS. For shutdown, turn off VS first, then control voltages. The sequence for the control voltages (VB1, VB2, VC1, VC2) is not critical.
   - b) For simultaneous start up it is recommended that the delay between the supply control voltages (VB1, VB2, VC1, VC2) and VS be minimized, or that all voltages be applied at the same time

SAFETY AND HANDLING INFORMATION ON GaAs DEVICES

Arsenic Compound (GaAs Devices)
The product contains arsenic (As) as a compound.
This material is stable for normal use; however, its dust or vapor may be potentially hazardous to the human body.
Avoid ingestion, fracture, burning or chemical treatment to the product.

- Do not put the product in your mouth.
- Do not burn or destroy the product.
- Do not perform chemical treatment for the product.

Keep laws and ordinances related to the disposal of the products.

ESD Considerations:

This device can be damaged by ESD; therefore appropriate precautions must be taken to avoid exposure to ESD and EOS during handling, assembly, and testing of these devices. Failure to adhere to proper ESD/EOS precautions during handling and assembly of these devices can damage or adversely affect device reliability.

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