REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Delete coplanarity limit from A1 dimensions under Figure 1. Update document paragraphs to current requirements. - ro	23-09-07	J. ESCHMEYER

Prepared in accordance with ASME Y14.24

Vendor Item Drawing

Revision Status of Sheets

REV																						
SHEET																						
REV	A	A	A	A	A	A	A	A	A	A	A	A										
SHEET	1	2	3	4	5	6	7	8	9	10	11	12										

PMIC N/A

Original date of drawing
YY-MM-DD
18-05-23

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TITLE
MICROCIRCUIT, LINEAR, MONOLITHIC, GALLIUM ARSENIDE, NONREFLECTIVE, 100 MHz TO 4 GHz SP4T SWITCH

SIZE	CAGE CODE	DWG NO.
A	16236	V62/18607
REV A		PAGE 1 OF 12

AMSC N/A

5962-V111-23

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance gallium arsenide (GaAs) nonreflective, 100 MHz to 4 GHz single pole, four throw (SP4T) switch microcircuit, with an operating temperature range of -55°C to +125°C.

1.2 Vendor Item Drawing Administrative Control Number. The manufacturer's PIN is the item of identification. The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation:

V62/18607	-	01	X	E
Drawing number		Device type (See 1.2.1)	Case outline (See 1.2.2)	Lead finish (See 1.2.3)

1.2.1 Device type(s).

Device type	Generic	Circuit function
01	HMC241	Gallium arsenide (GaAs) nonreflective, 100 MHz to 4 GHz single pole, four throw (SP4T) switch

1.2.2 Case outline(s). The case outline(s) are as specified herein.

Outline letter	Number of pins	JEDEC PUB 95	Package style
X	16	MO-220-VEED-4	Lead frame chip scale package (LFCSP)

1.2.3 Lead finishes. The lead finishes are as specified below or other lead finishes as provided by the device manufacturer:

Finish designator	Material
A	Hot solder dip
B	Tin-lead plate
C	Gold plate
D	Palladium
E	Gold flash palladium
F	Tin-lead alloy (BGA/CGA)
Z	Other

1.3 Absolute maximum ratings. 1/

Positive supply voltage (V_{DD})	7 V
Digital control input voltage	-0.5 V to V_{DD} + 1 V
RF input power (f = 100 MHz to 4 GHz, T_C = 85°C): 2/	
V_{DD} = 3 V	
Through path	23.5 dBm
Terminated path	20 dBm
Hot switching	17.5 dBm
V_{DD} = 5 V	
Through path	28.5 dBm
Terminated path	23.5 dBm
Hot switching	22.5 dBm
Junction temperature range (T_J)	150°C
Storage temperature range (T_{STG})	-65°C to +150°C
Reflow (MSL 3 rating)	260°C
Thermal resistance, junction to ambient (θ_{JC}):	
Through path	144°C/W
Terminated path	300°C/W
Electrostatic discharge (ESD) rating:	
Human body model (HBM)	250 V

1.4 Recommended operating conditions. 3/

Supply voltage range (V_{DD})	3 V or 5 V
Operating case temperature range (T_C)	-55°C to +125°C

_____

1/ Stresses beyond those listed under “absolute maximum rating” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

2/ See figure 3.

3/ Use of this product beyond the manufacturers design rules or stated parameters is done at the user’s risk. The manufacturer and/or distributor maintain no responsibility or liability for product used beyond the stated limits.

2. APPLICABLE DOCUMENTS

JEDEC Solid State Technology Association

JEDEC PUB 95 – Registered and Standard Outlines for Semiconductor Devices

(Copies of these documents are available online at https://www.jedec.org.)

3. REQUIREMENTS

3.1 Marking. Parts shall be permanently and legibly marked with the manufacturer's part number as shown in 6.3 herein and as follows:

A. Manufacturer's name, CAGE code, or logo
B. Pin 1 identifier
C. ESDS identification (optional)

3.2 Unit container. The unit container shall be marked with the manufacturer's part number and with items A and C (if applicable) above.

3.3 Electrical characteristics. The maximum and recommended operating conditions and electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.4 Design, construction, and physical dimension. The design, construction, and physical dimensions are as specified herein.

3.5 Diagrams.

3.5.1 Case outline. The case outline shall be as shown in 1.2.2 and figure 1.

3.5.2 Terminal connections. The terminal connections shall be as shown in figure 2.

3.5.3 Maximum input power versus case temperature. The maximum input power versus case temperature shall be as shown in figure 3.

3.5.4 Truth table. The truth table shall be as shown in figure 4.

3.5.5 CTRLA and CTRLB interface schematic. The CTRLA and CTRLB interface schematic shall be as shown in figure 5.

TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Conditions 2/	Temperature, T_C	Device type	Limits		Unit
					Min	Max	
Frequency range	f		+25°C	01	0.1	4	GHz
Insertion loss between RFC and RF1 to RF4 (on)		100 MHz to 1 GHz	+25°C	01		0.9	dB
					0.6 typical		
		1 GHz to 2 GHz				1.0	
					0.7 typical		
		2 GHz to 2.5 GHz				1.2	
					0.9 typical		
		2.5 GHz to 4 GHz				1.5	
					1.2 typical		
Isolation between RFC and RF1 to RF4 (off)		100 MHz to 1 GHz	+25°C	01	40		dB
					45 typical		
		1 GHz to 2 GHz			38		
					43 typical		
		2 GHz to 2.5 GHz			35		
					41 typical		
		2.5 GHz to 4 GHz			25		
					32 typical		
Return loss RFC and RF1 to RF4 (on)		100 MHz to 2.5 GHz	+25°C	01	18 typical		dB
		2.5 GHz to 4 GHz			12 typical		
Return loss RF1 to RF4 (off)		100 MHz to 4 GHz	+25°C	01	12 typical		dB
Switching, rise time and fall time	t_{RISE}, t_{FALL}	250 MHz to 4 GHz, 10% to 90% of radio frequency (RF) output	+25°C	01	30 typical		ns
Switching on time and off time	t_{ON}, t_{OFF}	250 MHz to 4 GHz, 50% V_{CTRL} to 90% of RF output	+25°C	01	100 typical		ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions 2/	Temperature, T_C	Device type	Limits		Unit
					Min	Max	
Input linearity, 3/ 1 dB power compression	P1dB	V_{DD} = 3 V, 250 MHz to 4 GHz	+25°C	01	24 typical		dBm
		V_{DD} = 5 V, 250 MHz to 4 GHz			23		
					29 typical		
Input linearity, 3/ third order intercept	IP3	V_{DD} = 3 V, 250 MHz to 4 GHz, 10 dBm per tone, 1 MHz spacing	+25°C	01	50 typical		dB
		V_{DD} = 5 V, 250 MHz to 4 GHz, 10 dBm per tone, 1 MHz spacing			47 typical		
Supply voltage	V_{DD}	V_{DD} pin	+25°C	01	3	5	V
Supply current	I_{DD}	V_{DD} pin	+25°C	01		5	mA
					2.5 typical		
Digital control inputs		CTRLA and CTRLB pins					
Voltage	V_{CTL}						
Low	V_{INL}	V_{DD} = 3 V	+25°C	01	0	0.8	V
		V_{DD} = 5 V			0	0.8	
High	V_{INH}	V_{DD} = 3 V	+25°C	01	2	3	V
		V_{DD} = 5 V			2	5	
Current, low	I_{INL}		+25°C	01	0.2 typical		µA
Current, high	I_{INH}		+25°C	01	40 typical		µA

1/ Testing and other quality control techniques are used to the extent deemed necessary to assure product performance over the specified temperature range. Product may not necessarily be tested across the full temperature range and all parameters may not necessarily be tested. In the absence of specific parametric testing, product performance is assured by characterization and/or design.

2/ Unless otherwise specified, V_{DD} = 3 V or 5 V, control voltage (CTRL) = 0 V or V_{DD}, T_C = 25°C, and 50 Ω system.

3/ Input linearity performance degrades at frequencies less than 250 MHz.

Case X

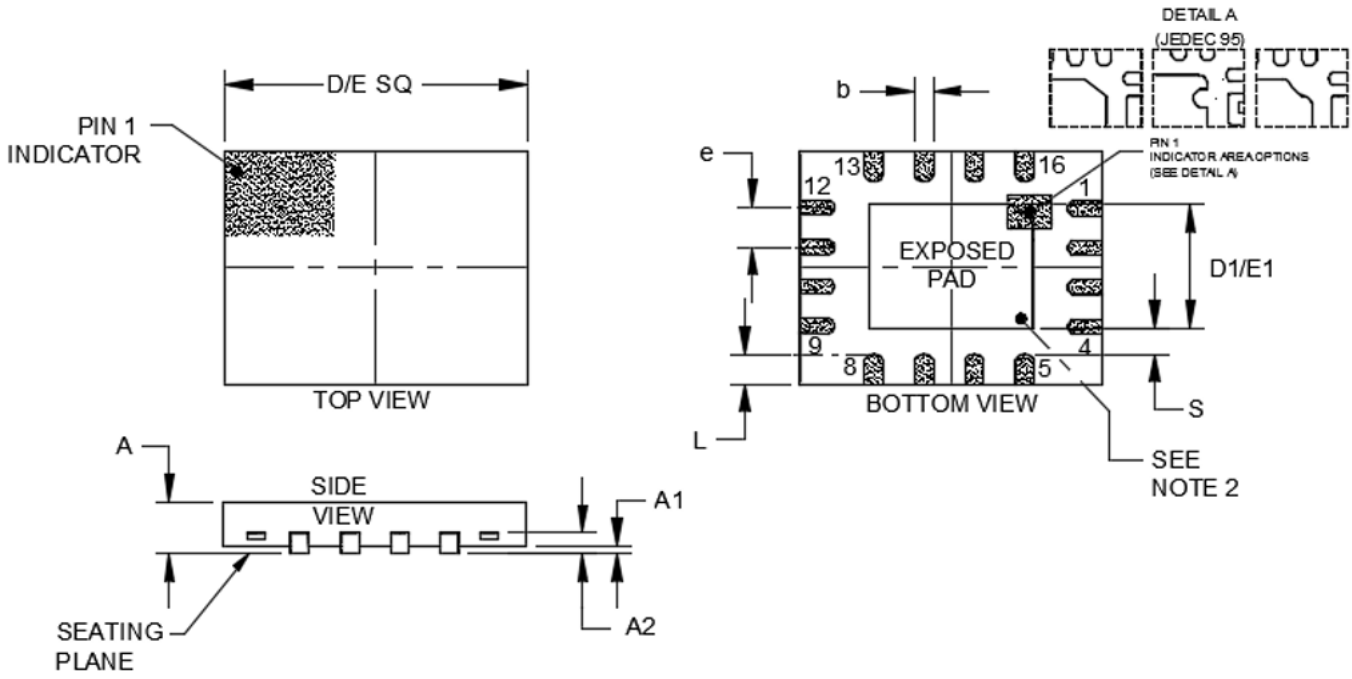


FIGURE 1. Case outline.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/18607
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Symbol	Dimensions					
	Inches			Millimeters		
	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum
A	.0314	.0334	.0354	0.80	0.85	0.90
A1		.0007	.0019		0.02	0.05
A2	.0079 REF			0.203 REF		
b	.0078	.0098	.0118	0.20	0.25	0.30
D/E	.1141	.1181	.1220	2.90	3.00	3.10
D1/E1	.0629	.0669	.0708	1.60	1.70	1.80
e	.0196 BSC			0.50 BSC		
L	.0137	.0157	.0177	0.35	0.40	0.45
S	.0078	---	---	0.20	---	---

NOTES:

1. Controlling dimensions are millimeter, inch dimensions are given for reference only.
2. For proper connection of the exposed pad, refer to the pin configuration and function descriptions section of the manufacturer's datasheet.
3. Falls within reference to JEDEC MO-220-VEED-4.

FIGURE 1. Case outline - Continued.

Device type	01	
Case outline	X	
Terminal number	Terminal symbol	Description
1	RF4	RF Port 4. This pin is dc-coupled and matched to 50 Ω. A dc blocking capacitor is required on this pin.
2	NIC	Not internally connected. These pins must be connected to the printed circuit board (PCB) RF ground to maximize isolation.
3	NIC	Not internally connected. These pins must be connected to the printed circuit board (PCB) RF ground to maximize isolation.
4	RF3	RF Port 3. This pin is dc-coupled and matched to 50 Ω. A dc blocking capacitor is required on this pin.
5	GND	Ground. The package bottom has an exposed metal pad that must connect to the PCB RF/dc ground.
6	V_{DD}	Supply voltage
7	B	Logic control input B. See Figure 5 for the control input interface schematic. See the recommended input control voltages range in Table 1 and the control voltage truth table figure 4.
8	A	Logic control input A. See Figure 5 for the control input interface schematic. See the recommended input control voltages range in Table 1 and the control voltage truth table figure 4.
9	RF2	RF Port 2. This pin is dc-coupled and matched to 50 Ω. A dc blocking capacitor is required on this pin.
10	NIC	Not internally connected. These pins must be connected to the printed circuit board (PCB) RF ground to maximize isolation.
11	NIC	Not internally connected. These pins must be connected to the printed circuit board (PCB) RF ground to maximize isolation.
12	RF1	RF Port 1. This pin is dc-coupled and matched to 50 Ω. A dc blocking capacitor is required on this pin.
13	NIC	Not internally connected. These pins must be connected to the printed circuit board (PCB) RF ground to maximize isolation.
14	GND	Ground. The package bottom has an exposed metal pad that must connect to the PCB RF/dc ground.
15	RFC	RF common port. This pin is dc-coupled and matched to 50 Ω. A dc blocking capacitor is required on this pin.
16	GND	Ground. The package bottom has an exposed metal pad that must connect to the PCB RF/dc ground.
	EPAD	Exposed pad. The exposed pad must be connected to RF/dc ground.

FIGURE 2. Terminal connections.

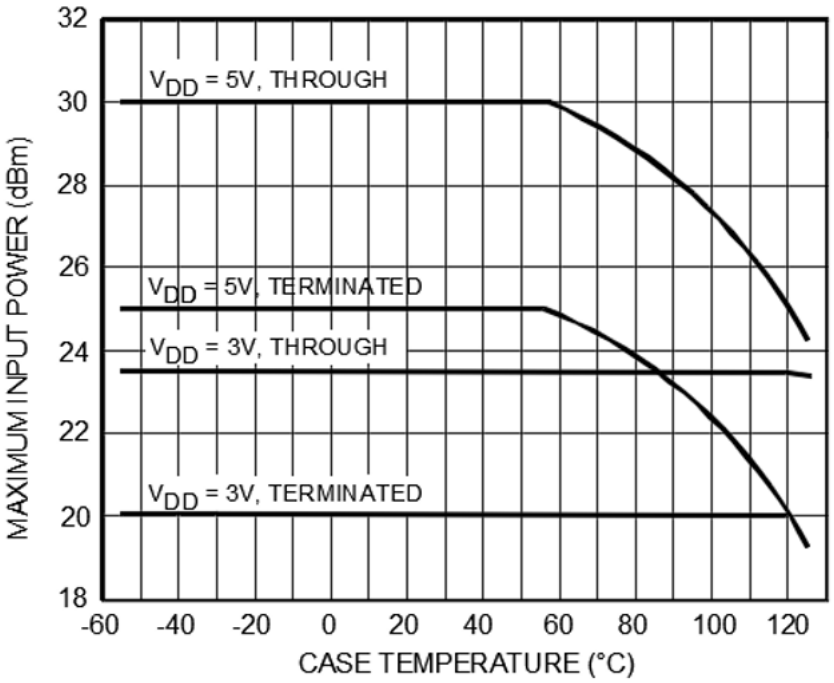


FIGURE 3. Maximum input power versus case temperature.

Digital control input		RF Paths			
CTRLA	CTRLB	RFC to RF1	RFC to RF2	RFC to RF3	RFC to RF4
Low	Low	Insertion loss (on)	Isolation (off)	Isolation (off)	Isolation (off)
High	Low	Isolation (off)	Insertion loss (on)	Isolation (off)	Isolation (off)
Low	High	Isolation (off)	Isolation (off)	Insertion loss (on)	Isolation (off)
High	High	Isolation (off)	Isolation (off)	Isolation (off)	Insertion loss (on)

FIGURE 4. Truth table.

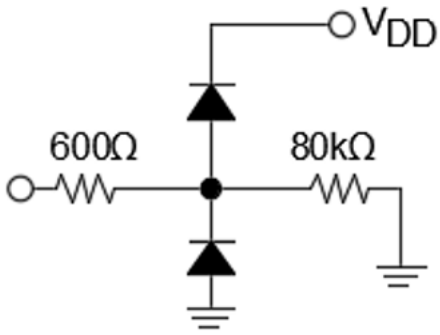


FIGURE 5. CTRLA and CTRLB interface schematic.

4. VERIFICATION

4.1 Product assurance requirements. The manufacturer is responsible for performing all inspection and test requirements as indicated in their internal documentation. Such procedures should include proper handling of electrostatic sensitive devices, classification, packaging, and labeling of moisture sensitive devices, as applicable.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Preservation, packaging, labeling, and marking shall be in accordance with the manufacturer's standard commercial practices for electrostatic discharge sensitive devices.

6. NOTES

6.1 ESDS. Devices are electrostatic discharge sensitive and are classified as ESDS class 1 minimum.

6.2 Configuration control. The data contained herein is based on the salient characteristics of the device manufacturer's data book. The device manufacturer reserves the right to make changes without notice. This drawing will be modified as changes are provided.

6.3 Suggested source(s) of supply. Identification of the suggested source(s) of supply herein is not to be construed as a guarantee of present or continued availability as a source of supply for the item. DLA Land and Maritime maintains an online database of all current sources of supply at https://landandmaritimeapps.dla.mil/programs/smcr/.

Vendor item drawing administrative control number 1/	Device manufacturer CAGE code	Mode of transportation and quantity	Vendor part number
V62/18607-01XE	24355	Reel, 50 units	HMC241ATCPZ-EP-PT
		Reel, 500 units	HMC241ATCPZ-EP-R7

1/ The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation.

CAGE code	Source of supply
24355	Analog Devices Route 1 Industrial Park P.O. Box 9106 Norwood, MA 02062 Point of contact: 20 Alpha Road Chelmsford, MA 01824-4123