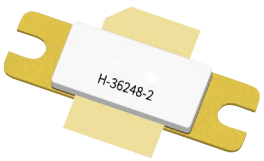
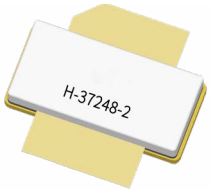
GTVA126001EC/FC

Thermally-Enhanced High Power RF GaN HEMT 600 W, 50 V, DC – 1.4 GHz



Package Types: H-36248-2
PN's: GTVA126001EC



Package Types: H-37248-2
PN's: GTVA126001FC

Description

The GTVA126001EC and GTVA126001FC are 600 W GaN on SiC high electron mobility transistors (HEMT) for use in the DC to 1400 MHz frequecy band. They feature input matching, high efficiency, and thermally-enhanced packages.

Features

- GaN on SiC HEMT technology
- Input matched
- Typical pulsed CW performance (class AB), 1200 MHz, 50 V, 300 µs pulse width, 10% duty cycle
  - Output power P_{3dB} = 600 W
  - Drain efficiency = 65%
  - Gain = 18 dB
- Capable of withstanding a 10:1 load mismatch (all phase angles) at 600 W peak power under pulse conditions: 300 µs pulse width, 10% duty cycle, V_{DD} = 50 V, I_{DQ} = 100 mA
- Human body model class 1 C (per ANSI/ESDA/JEDEC JS-001)
- Pb-free and RoHS compliant

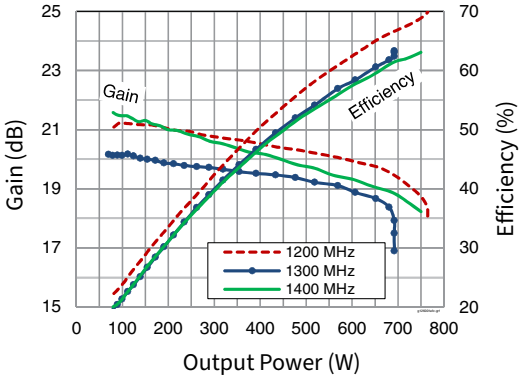


Figure 1. Power Sweep: Gain & Efficiency
50 V, I_{DQ}=100 mA, 300 µs Pulse Width, 10% Duty Cycle

RF Characteristics

Pulsed RF performance (tested in the test fixture)
V_{DD} = 50 V, I_{DQ} = 100 mA, P_{OUT} = 600 W, ƒ = 1400 MHz, 300 µs pulse width, 10% duty cycle

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Gain	G_{ps}	19	20	22	dB
Drain Efficiency	η_D	56	63	–	%

All published data at T_{CASE} = 25 °C unless otherwise indicated

Note:
ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics

Characteristics	Conditions	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V_{GS} = -8 V, I_D = 10 mA	$V_{(BR)DSS}$	150	–	–	V
Drain-Source Leakage Current	V_{GS} = -8 V, V_{DS} = 50 V	I_{DSS}	–	–	12	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 85 mA	$V_{GS(th)}$	-3.8	-3.0	-2.3	V

Recommended Operating Conditions

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Drain Operating Voltage		V_{DD}	0	–	50	V
Gate Quiescent Voltage	V_{DS} = 50 V, I_D = 100 mA	$V_{GS(Q)}$	-4.3	-3.2	-2.4	V

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	125	V
Gate-Source Voltage	V_{GS}	-10 to +2	V
Gate Current	I_G	100	mA
Drain Current	I_D	10	A
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C

Operation above the maximum values listed here may cause permanent damage. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the component. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. For reliable continuous operation, the device should be operated within the operating voltage range (V_{DD}) specified above.

Thermal Characteristics

Characteristics	Symbol	Value	Unit
Thermal Resistance[1]	$R_{\theta JC}$	0.28	°C/W
Thermal Resistance[2]	$R_{\theta JC}$	0.42	°C/W

Notes:
[1] T_{CASE} = 85 °C, P_{DISS} = 334 W, 500 µs pulse width, 10% duty cycle.
[2] T_{CASE} = 85 °C, P_{DISS} = 333 W, CW.

Ordering Information

Type and Version	Order Code	Package and Description	Shipping
GTVA126001EC V1 R0	GTVA126001EC-V1-R0	H-36248-2, Single-Ended, Bolt-Down Flange	Tape & Reel, 50 pcs
GTVA126001EC V1 R2	GTVA126001EC-V1-R2	H-36248-2, Single-Ended, Bolt-Down Flange	Tape & Reel, 250 pcs
GTVA126001FC V1 R0	GTVA126001FC-V1-R0	H-37248-2, Single-Ended, Earless Flange	Tape & Reel, 50 pcs
GTVA126001FC V1 R2	GTVA126001FC-V1-R2	H-37248-2, Single-Ended, Earless Flange	Tape & Reel, 250 pcs

Typical Performance

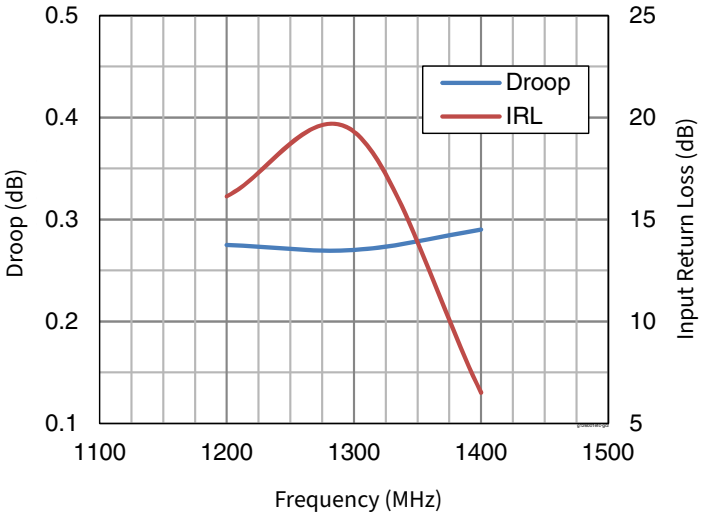


Figure 2. Pulse Droop and IRL V_{DS}= 50 V, I_{DQ}= 100 mA, P_{OUT} @ P_{3db} 300 µs Pulse Width, 10% Duty Cycle

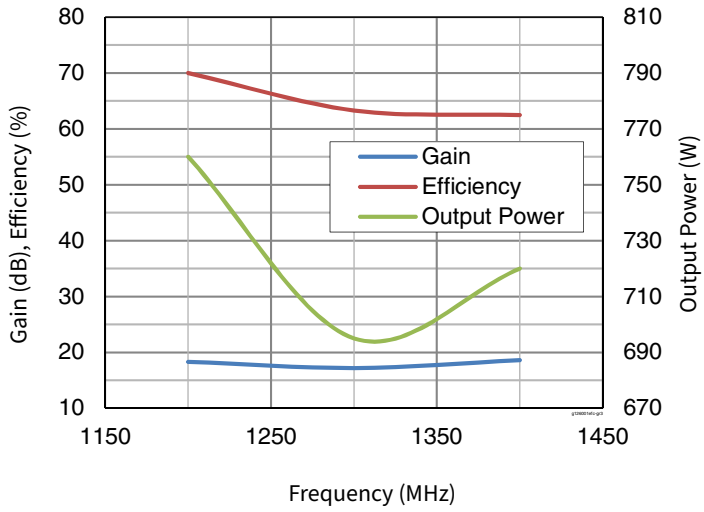


Figure 3. Frequency Sweep V_{DS}= 50 V, I_{DQ}= 100 mA, P_{OUT} @ P_{3dB} 300 µs Pulse Width, 10% Duty Cycle

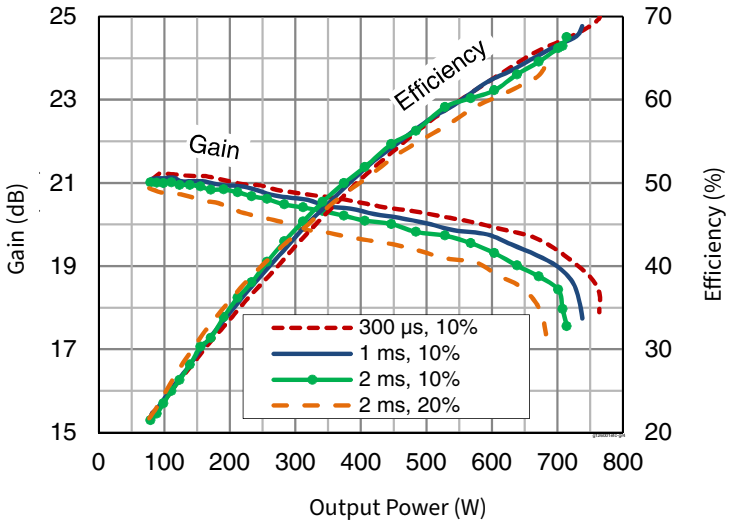


Figure 4. Power Sweep: 50 V, I_{DQ}= 100 mA, ƒ= 1200 MHz

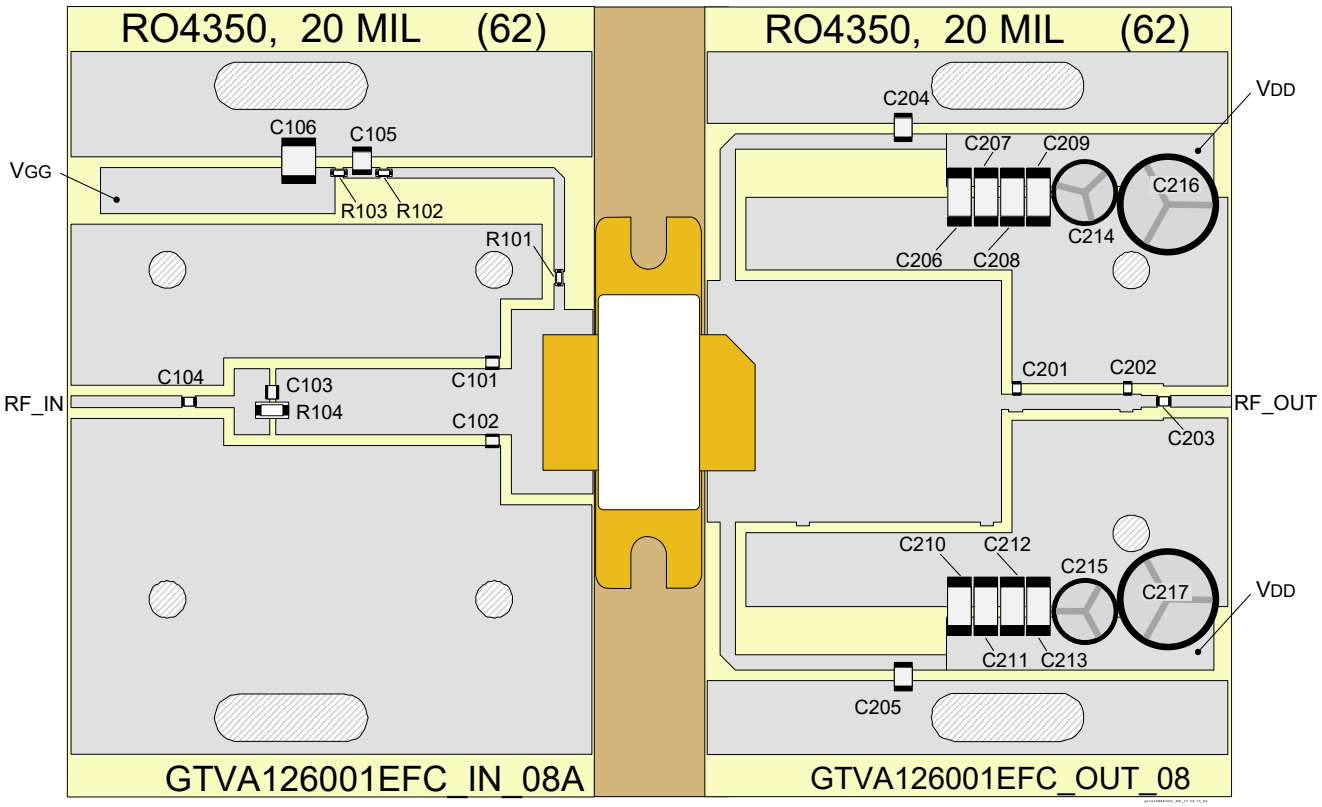
Load Pull Performance

Each side load pull performance –16 µs pulse width, 10% duty cycle, class AB, V_{DD} = 50 V, 60 mA

	Max Output Power					Max Efficiency					Z Optimum					
Freq [MHz]	P_{OUT} [dBm]	P_{OUT} [W]	Eff. [%]	Gain [dB]	Z_{Load} [Ω]	P_{OUT} [dBm]	P_{OUT} [W]	Eff. [%]	Gain [dB]	Z_{Load} [Ω]	P_{OUT} [dBm]	P_{OUT} [W]	Eff. [%]	Gain [dB]	Z_{Load} [Ω]	Z_{Source} [Ω]
1200	59.20	832	66.29	19.34	1.54 + j0.11	58.12	649	75.83	20.09	2.19 + j0.97	59.09	811	70.51	19.79	1.68 + j0.33	1.00 – j1.73
1300	58.62	728	59.62	18.89	1.12 + j0.12	57.56	570	71.85	20.53	1.54 + j0.94	58.41	693	67.11	19.98	1.22 + j0.44	4.43 – j1.20
1400	58.55	716	59.68	19.65	1.00 + j0.21	57.35	543	70.39	20.18	1.38 + j0.85	58.27	671	65.89	20.23	1.15 + j0.45	2.35 + j0.66

Reference Circuit Tuned for DC - 1.4 GHz

DUT	GTVA126001EC/FC V1
Test Fixture Part No.	LTN/GTVA126001EC V1, LTN/GTVA126001FC V1
PCB	Rogers 4350, 0.508 mm [.020"] Thick, 2 oz. Copper, ε_r = 3.66

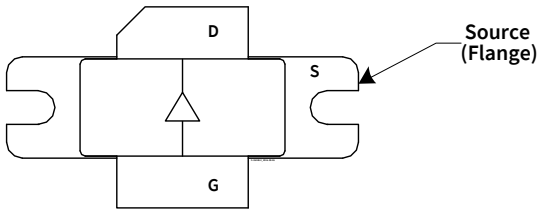


Reference circuit assembly diagram (not to scale)

Reference Circuit (Cont.)

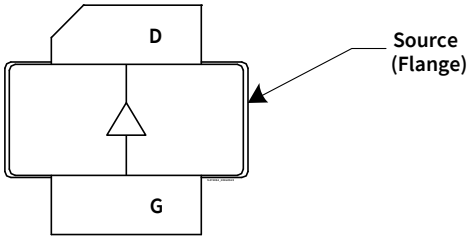
Components Information			
Component	**Description**	**Manufacturer**	**P/N**
Input			
C101, C102	Capacitor, 1.2 pF	ATC	ATC800A1R2CT250T
C103, C104	Capacitor, 56 pF	ATC	ATC800A560JT250T
C105	Capacitor, 39 pF	ATC	ATC100B390JW500XB
C106	Capacitor, 1 µF	TDK Corporation	C4532X7R2A105M230KA
R101	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-3GEYJ100V
R102	Resistor, 100 ohms	Panasonic Electronic Components	ERJ-3GEYJ101V
R103	Resistor, 5.6 ohms	Panasonic Electronic Components	ERJ-8RQJ5R6V
R104	Resistor, 30 ohms	Panasonic Electronic Components	ERJ-8GEYJ300V
Output			
C201	Capacitor, 1.6 pF	ATC	ATC800A1R6CT250T
C202	Capacitor, 3.6 pF	ATC	ATC100A3R6CW150XB
C203	Capacitor, 56 pF	ATC	ATC800A560JT250T
C204, C205	Capacitor, 39 pF	ATC	ATC100B390JW500XB
C206, C207, C208, C209, C210, C211, C212, C213	Capacitor, 10 µF, 100 V	TDK Corporation	C5750X7S2A106M230KB
C214, C215	Capacitor, 22 µF	Cornell Dubilier Electronics (CDE)	SEK220M100ST
C216, C217	Capacitor, 220 µF	Panasonic Electronic Components	ECA-2AHG221

Pinout Diagrams (Top View)



GTVA126001EC
Package H-36248-2

Pin	Description
D	Drain
G	Gate
S	Source (Flange)



GTVA126001FC
Package H-37248-2

Pin	Description
D	Drain
G	Gate
S	Source (Flange)

Package Outline Specifications

Package H-36248-2

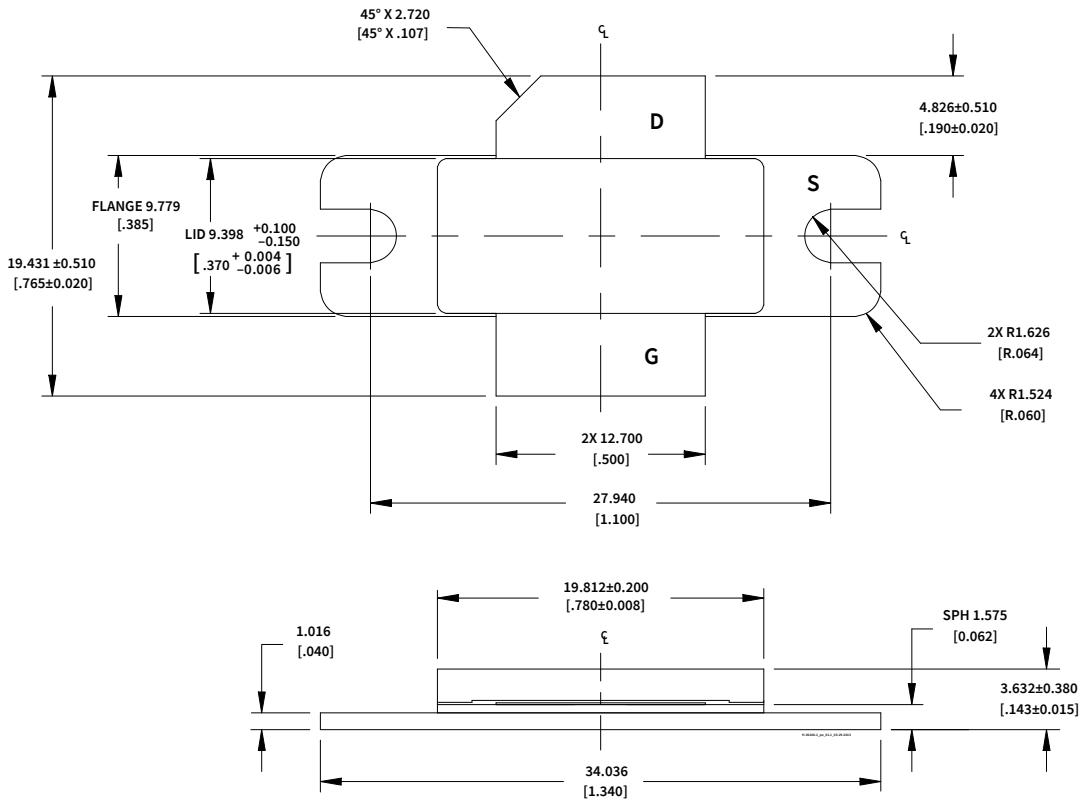
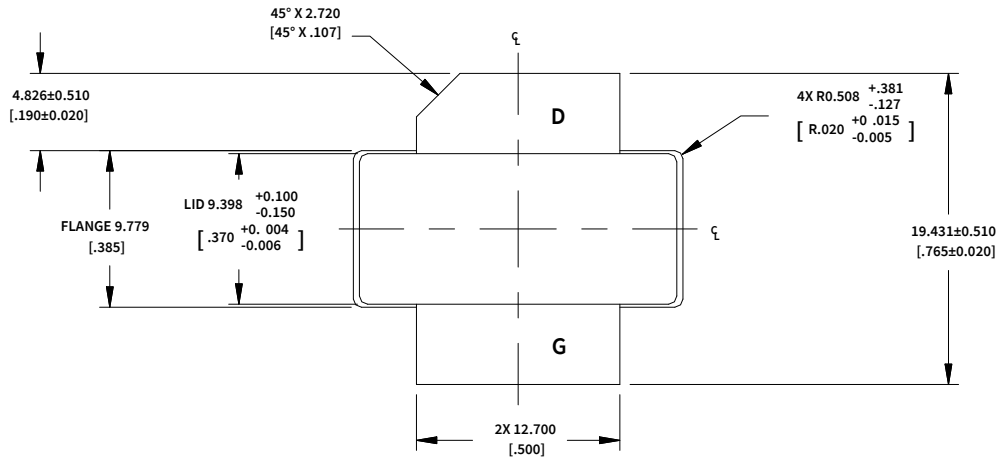


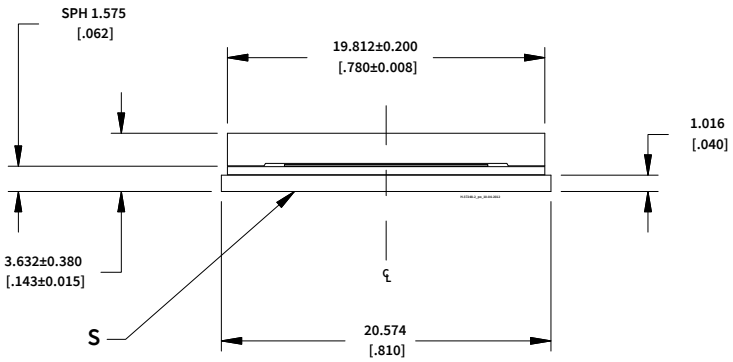
Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994
2. Primary dimensions are mm; alternate dimensions are inches
3. All tolerances ± 0.127 [0.005]
4. Pins: D – drain, G – gate, S – source
5. Lead thickness: 0.10 +0.051/–0.025 mm [0.004 +0.002/–0.001 inch]
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch]

Package Outline Specifications (Cont.)

Package H-37248-2





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Revision History

Revision	Date	Data Sheet	Page	Subjects (Major Changes at Each Revision)
01	2016-09-27	Advance	All	Proposed Specification for New Product Development
02	2017-07-10	Advance	All	Includes GTVA126001FC Product, Package H-37248-4
03	2017-11-17	Preliminary	All	Add Preliminary Performance Information and Circuit Specifications
04	2018-05-01	Preliminary	All	Converted to the Data Sheet
05	2019-02-06	Production	All	Information for Production-Released Device, Including Firm Specifications, Operating Conditions and Performance, and Reference Circuit Specifications
05-c	2019-06-21	Production	2	Edited Thermal Characteristics Note for [1] T_{CASE} and [2] T_{CASE}
06	2020-03-10	Production	All	Updated Frequency Range
06.1	2023-09-29	Production	All	Removed branding

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