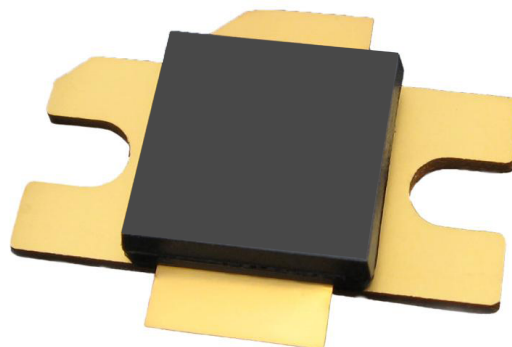


FEATURES

Silicon MOSFET Technology
Operation from 24V to 50V
High Power Gain
Extreme Ruggedness
Internal Input Matching
Excellent Thermal Stability
All Gold Bonding Scheme
Pb-free and RoHS Compliant

PACKAGE



TYPICAL PERFORMANCE

High voltage vertical technology is well suited for high power pulsed applications in the UHF band including weather and long range radar applications.

MODE	FREQUENCY (MHz)	VDD (V)	IDQ (mA)	Power (W)	GAIN (dB)	η (%)	IRL (dB)	VSWR
Class AB	450	50	50	175	25.5	62	-8.5	20:1

Table 1: Typical RF Performance in broadband test fixture at 25 C temperature with RF pulse conditions of pulse width = 300μs and pulse duty cycle = 10%.

DESCRIPTION

The high power HVV0405-175 device is an enhancement mode RF MOSFET power transistor designed for pulsed applications in the UHF-Band from 420MHz to 470MHz. The high voltage MOSFET technology produces over 175W of pulsed output power while offering high gain, high efficiency, and ease of matching with a 50 V supply. The vertical device structure assures high reliability and ruggedness as the device is specified to withstand a 20:1 VSWR at all phase angles under full rated output power.

ORDERING INFORMATION

Device Part Number: HVV0405-175
Evaluation Kit Part Number: HVV0405-175-EK

HVV0405-175 High Voltage, High Ruggedness

UHF Pulsed Power Transistor

420-470 MHz, 300 μ s Pulse, 10% Duty Cycle

For UHF band, Weather and Long Range Radar Applications

ABSOLUTE MAXIMUM RATING (IEC 134)

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	95	V
V _{GSS}	Gate-Source Voltage	-10, 10	V
I _{DS(max)}	Drain Current	14	A
P _D ¹	Power Dissipation	438	W
P _{in}	Input Power	1.2	W
T _s	Storage Temperature	-40 to +150	°C
T _j	Junction Temperature	200	°C

THERMAL/RUGGEDNESS PERFORMANCE

Symbol	Parameter	Max	Unit
θ_{JC}^2	Thermal Resistance	0.40	°C/W

Symbol	Parameter	Test Condition	Max	Units
LMT ²	Load Mismatch Tolerance	F = 450 MHz	20:1	VSWR

The HVV0405-175 device is capable of withstanding an output load mismatch corresponding to a 20:1 VSWR at rated output power and nominal operating voltage across the frequency band of operation.

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Min	Typical	Max	Unit
V _{BR(DSS)}	Drain-Source Breakdown	V _{GS} =0V, I _D =5mA	95	102	-	V
I _{DSS}	Drain Leakage Current	V _{GS} =0V, V _{DS} =50V	-	50	100	μ A
I _{GSS}	Gate Leakage Current	V _{GS} =5V, V _{DS} =0V	-	10	100	nA
G _p ²	Power Gain	F=450MHz	23.5	25.5	27.5	dB
IRL ²	Input Return Loss	F=450MHz	-	-8	-6	dB
η_D^2	Drain Efficiency	F=450MHz	55	62	-	%
V _{GS(Q)} ³	Gate Quiescent Voltage	V _{DD} =50V, I _{DQ} =50mA	1.1	1.45	1.8	V
V _{TH}	Threshold Voltage	V _{DD} =5V, I _D =300 μ A	0.7	1.2	1.7	V

PULSE CHARACTERISTICS

Symbol	Parameter	Conditions	Min	Typical	Max	Units
t _r ⁴	Rise Time	F=450MHz	-	<25	50	nS
t _f ⁴	Fall Time	F=450MHz	-	<22	50	nS
PD ⁴	Pulse Droop	F=450MHz	-	0.3	0.5	dB

Notes:

1) Rated at T_{CASE} = 25°C

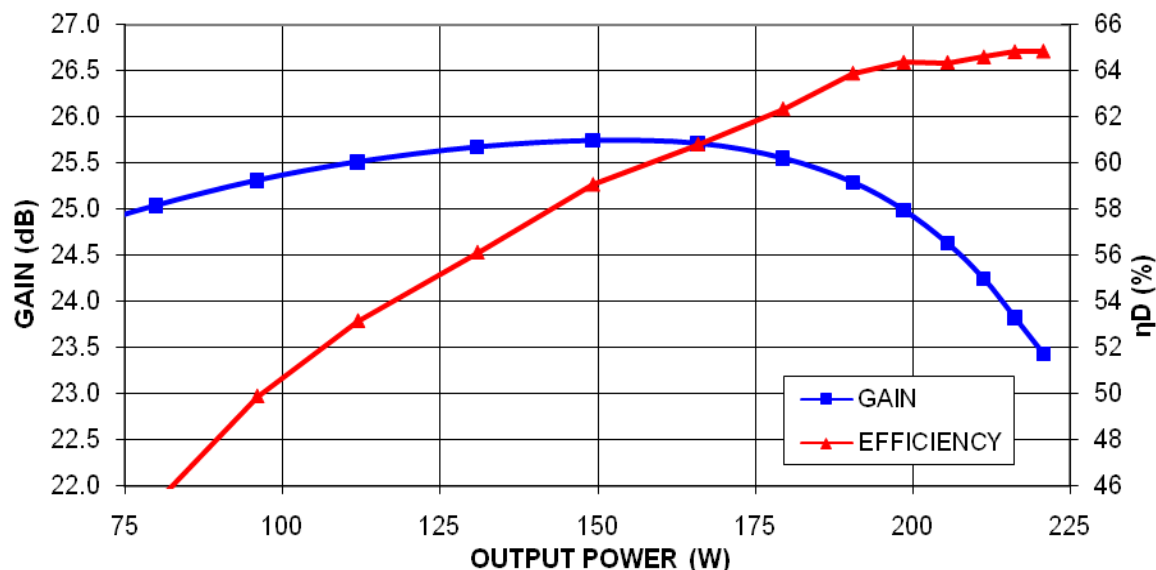
2) All parameters measured under pulsed conditions at 175W output power measured at the 10% point of the pulse with pulse width = 300 μ sec, duty cycle = 10% and V_{DD} = 50V, I_{DQ} = 50mA in a broadband matched test fixture.

3) Amount of gate voltage required to attain nominal quiescent current.

4) Guaranteed by design.

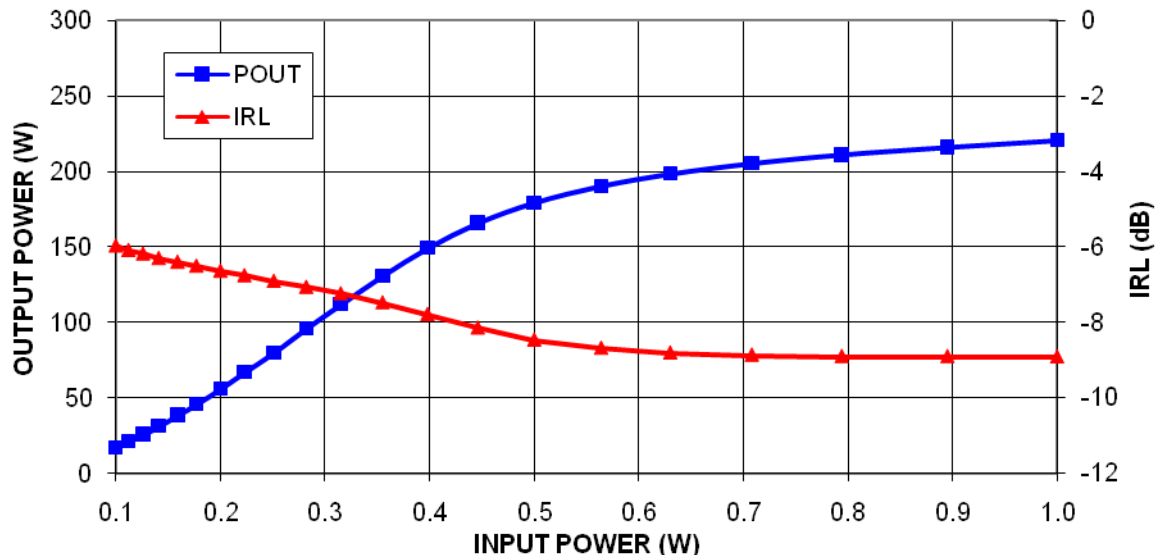
HVV0405-175 High Voltage, High Ruggedness
UHF Pulsed Power Transistor
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Typical Power Performance
in a Broadband Matched Circuit



Typical device performance under Class AB mode of operation and RF pulse conditions of 300 μ s pulse width and 10% duty cycle with $V_{DD} = 50V$ and $I_{DQ} = 50mA$. The device was measured at 450MHz.

Typical Power Performance
in a Broadband Matched Circuit



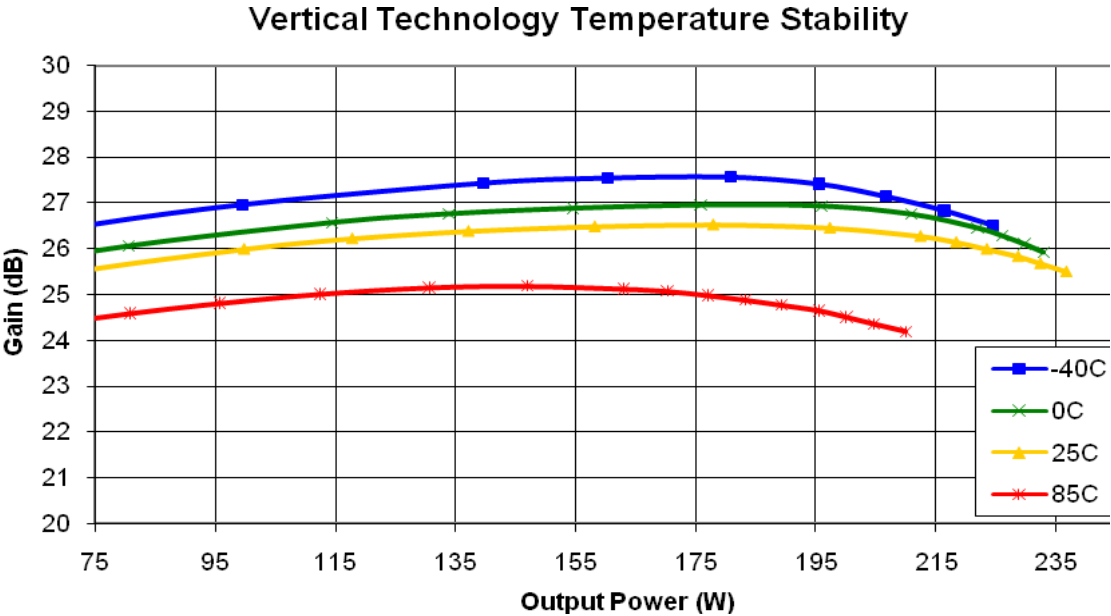
Typical device performance under Class AB mode of operation and RF pulse conditions of 300 μ s pulse width and 10% duty cycle with $V_{DD} = 50V$ and $I_{DQ} = 50mA$. The device was measured at 450MHz.

HVV0405-175 High Voltage, High Ruggedness

UHF Pulsed Power Transistor

420-470 MHz, 300µs Pulse, 10% Duty Cycle

For UHF band, Weather and Long Range Radar Applications

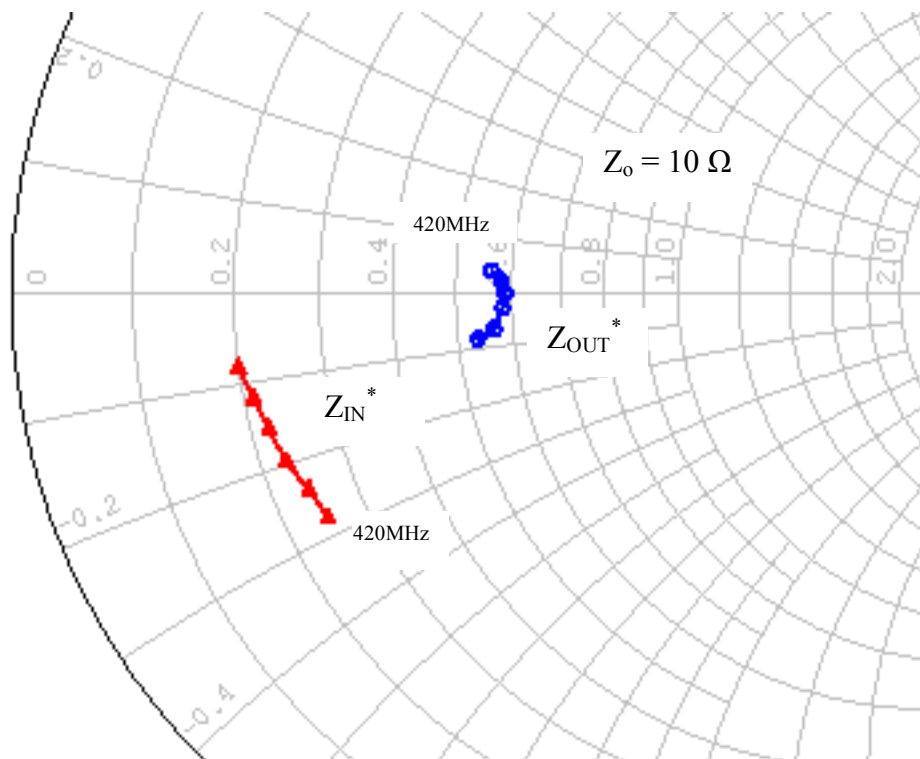


Typical device performance under Class AB mode of operation at 450MHz and RF pulse conditions of 300µs pulse width and 10% duty cycle with $V_{DD} = 50V$ and $I_{DQ} = 50mA$. The high voltage silicon vertical technology shows less than 1dB of power degradation over an extreme case teperature rise of 125°C.

Measured at P1dB Compression Point			
TEMP	Gain (dB)	Power (W)	Power (dBm)
-40C	26.5	224	53.5
0C	25.9	233	53.7
25C	25.5	237	53.7
85C	24.2	210	53.2

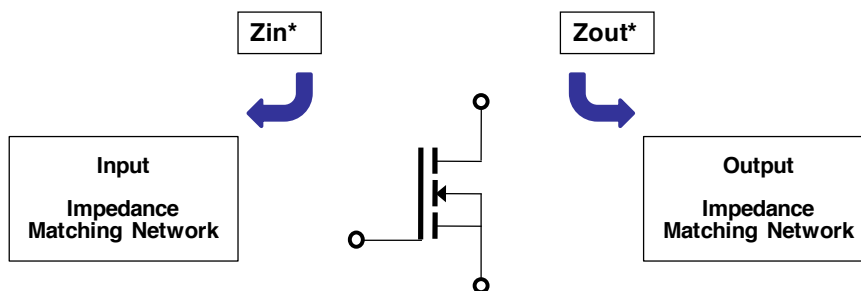
HVV0405-175 Performance over Temperature

HVV0405-175 High Voltage, High Ruggedness
UHF Pulsed Power Transistor
420-470 MHz, 300 μ s Pulse, 10% Duty Cycle
For UHF band, Weather and Long Range Radar Applications

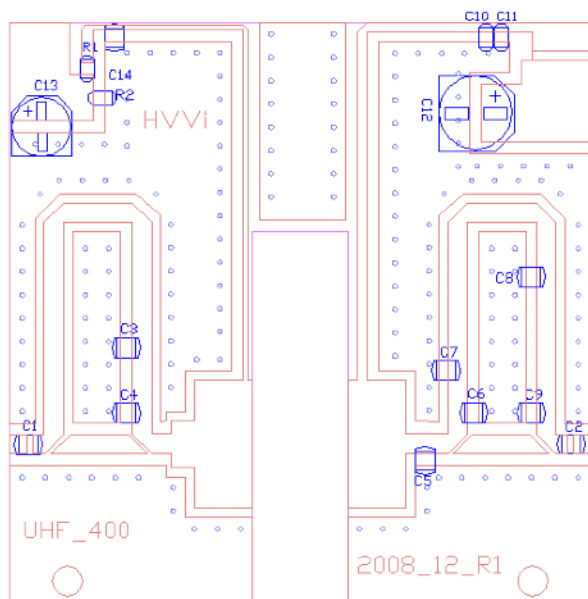
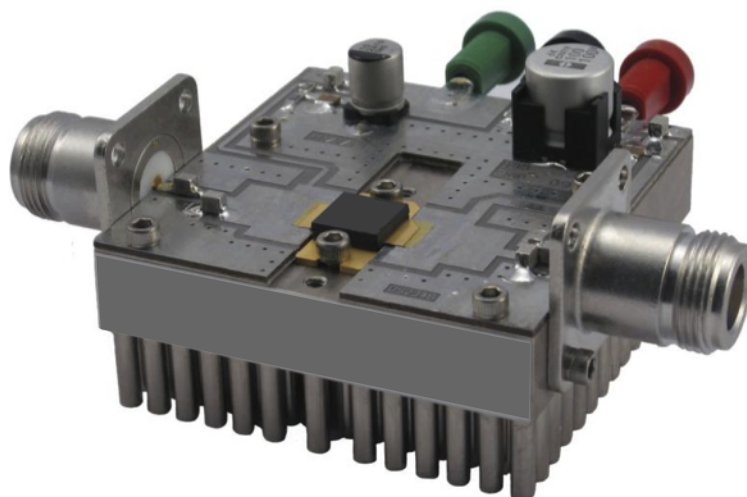


Test Circuit Impedance

Frequency	Zin*(ohms)	Zout*(ohms)
420 MHz	2.50-j2.78	5.62+j0.40
430 MHz	2.42-j2.37	5.80+j0.22
440 MHz	2.28j-1.97	5.88-j0.02
450 MHz	2.20-j1.56	5.83-j0.30
460 MHz	2.10-j1.18	5.65-j0.67
470 MHz	2.00-j.082	5.34-j0.82



HVV0405-175 High Voltage, High Ruggedness UHF Pulsed Power Transistor 420-470 MHz, 300µs Pulse, 10% Duty Cycle For UHF band, Weather and Long Range Radar Applications



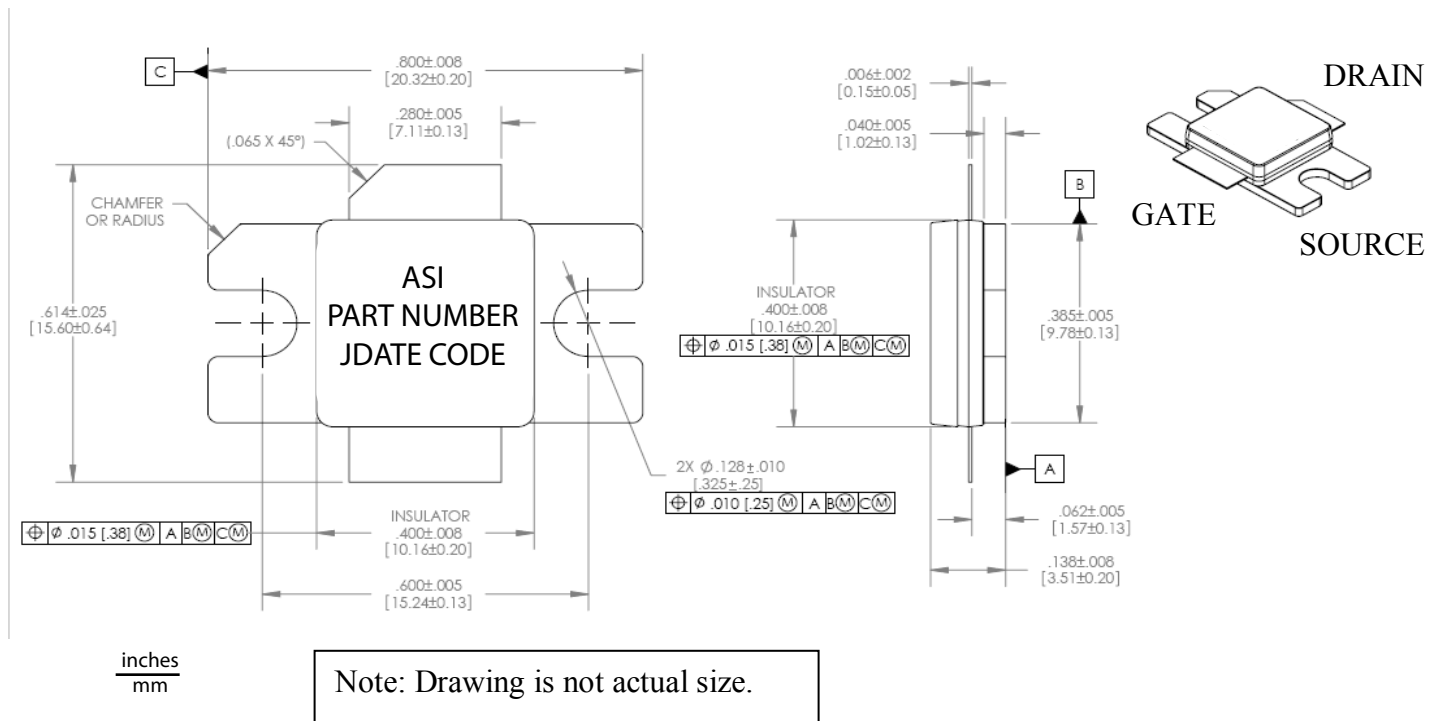
Demonstration Board Outline

Example of Demonstration Circuit

Part	Description	Part Number	Manufacturer
C1,C2,C14,C10 :	220 pF ATC 100B Chip Capacitor	100B221JP500X	ATC
C11:	1.0 uF, 100V Chip Capacitor (X7R 1210)	GRM32ER72A105MA01L	Murata
C3, C5:	15 pF ATC 100B Chip Capacitor	100B150JP500X	ATC
C4:	18 pF ATC 100B Chip Capacitor	100B180JP500X	ATC
C6:	12 pF ATC 100B Chip Capacitor	100B120JP500X	ATC
C7:	24 pF ATC 100B Chip Capacitor	100B240JP500X	ATC
C8:	2.0 pF ATC 100B Chip Capacitor	100B20JP500X	ATC
C9:	10.0 pF ATC 100B Chip Capacitor	100B100JP500X	ATC
R1:	56 Ohms Chip Resistor (1206) SMD	RC1206JR-07100KL	DIGI-KEY
R2:	1.5 K Ohms Chip Resistor (1206) SMD	RC1206JR-07100KL	DIGI-KEY
C8:	22.0 pF ATC 100B Chip Capacitor	100B220BW 150X	ATC
C13:	10uF 63V Elect FK SMD	PCE3479CT-ND	Digi Key
C12	100uF 63V Elect FK SMD	PCE3483CT-ND	Digi Key
RF Connectors (2)	Type "N" RF connectors	5919CC-TB-7	Coaxicom
DC Drain Conn	Connector Jack Banana Nylon Red	J151-ND	DIGI-KEY
DC Ground Conn.	Connector Jack Banana Nylon Black	J152-ND	DIGI-KEY
DC Gate Conn.	Connector Jack Banana Nylon Green	J153-ND	DIGI-KEY
PCB Board	PCB: Arlon, 30 mils thick, 2.55 Dielectric, 2 oz Copper		DS Electronics
Heat Sink	Cool Innovations Aluminum Heat Sink	3-252510RS3394	Cool Innovation
Device Clamp	Cool Innovations Nylon Clamp Foot	FXT000158	Cool Innovation
S.S. Screws (3)	4-40 X 1/4 Stainless Steel Hex Head Socket Screws	P242393	Copper State Bolt
Alloy Screws (4)	4-40 X 1/2 Alloy Socket Cap screw Hex Head	SCAS-0440-08C	Small Parts Inc
Metal Washers(4)	#4 Washer Zinc PLTD Steel Lock	ZSLW-004-M	Small Parts Inc

HVV0405-175 Demonstration Circuit Board Bill of Materials

PACKAGE DIMENSIONS



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