

## HVV0405-175 HIGH VOLTAGE, HIGH RUGGEDNESS

**UHF Pulsed Power Transistor**

**400-500 MHz, 300µs Pulse, 10% Duty Cycle**

**For UHF band, Weather and Long Range Radar Applications**

### FEATURES

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



### 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)	EFFICIENCY (%)	IRL (dB)
Class AB	450	50	50	175	25	55	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 period = 3ms.

### 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 480MHz. The high voltage HVVFET™ 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

Demo Kit Part Number: HVV0405-175-EK

Available through Richardson Electronics (<http://rfwireless.rell.com/>)



The innovative Semiconductor Company!

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### ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Min	Typical	Max	Unit
$V_{BR(DSS)}$	Drain-Source Breakdown	VGS=0V, ID=5mA	95	102	-	V
$I_{DSS}$	Drain Leakage Current	VGS=0V, VDS=48V	-	50	200	µA
$I_{GSS}$	Gate Leakage Current	VGS=5V, VDS=0V	-	1	5	µA
$G_P^1$	Power Gain	F=450MHz	23	25	-	dB
$IRL^1$	Input Return Loss	F=450MHz	-	-7	-4	dB
$\eta_D^1$	Drain Efficiency	F=450MHz	52	55	-	%
$VGS(Q)^2$	Gate Quiescent Voltage	VDD=50V, IDQ=50mA	1.1	1.45	1.8	V
VTH	Threshold Voltage	VDD=5V, ID=300µA	0.7	1.2	1.7	V

### PULSE CHARACTERISTICS

Symbol	Parameter	Conditions	Min	Typical	Max	Unit
$T_r^1$	Rise Time	F=450MHz	-	<25	50	nS
$T_f^1$	Fall Time	F=450MHz	-	<22	50	nS
$PD^1$	Pulse Droop	F=450MHz	-	0.3	0.5	dB

### THERMAL CHARACTERISTICS

Symbol	Parameter	Max	Unit
$\theta_{JC}^1$	Thermal Resistance	0.40	°C/W

### RUGGEDNESS PERFORMANCE

Symbol	Parameter	Test Condition	Max	Units
LMT <sup>1</sup>	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.

<sup>1</sup>**NOTE: All parameters measured under pulsed conditions at 175W output power measured at the 10% point of the pulse with pulse width = 300µsec, duty cycle = 10% and VDD = 50V, IDQ = 50mA in a broadband matched test fixture.**

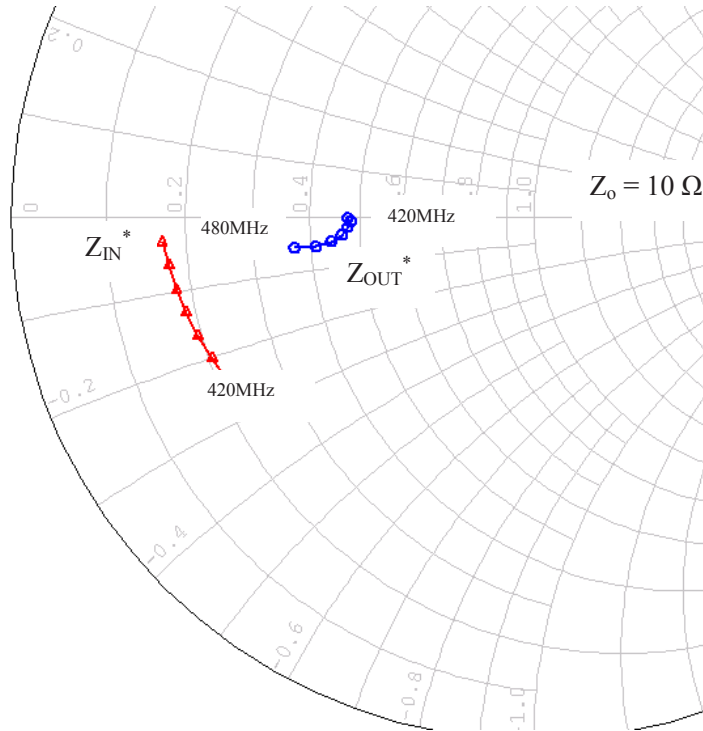
<sup>2</sup>**NOTE: Amount of gate voltage required to attain nominal quiescent current.**

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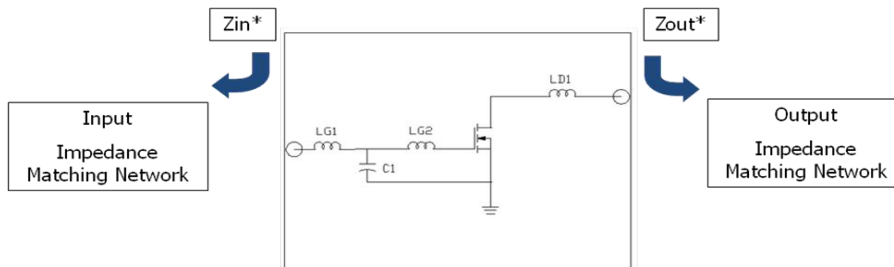
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Test Circuit Impedance

Frequency	Zin*(ohms)	Zout*(ohms)
420 MHz	2.14-j2.38	4.75-j0.01
430 MHz	2.05-j2.01	4.82-j0.08
440 MHz	1.95j-1.65	4.75-j0.20
450 MHz	1.87-j1.30	4.62-j0.37
460 MHz	1.80-j0.98	4.40-j0.48
470 MHz	1.75-j.064	4.10-j0.56
480 MHz	1.68-j0.33	3.70-j0.55

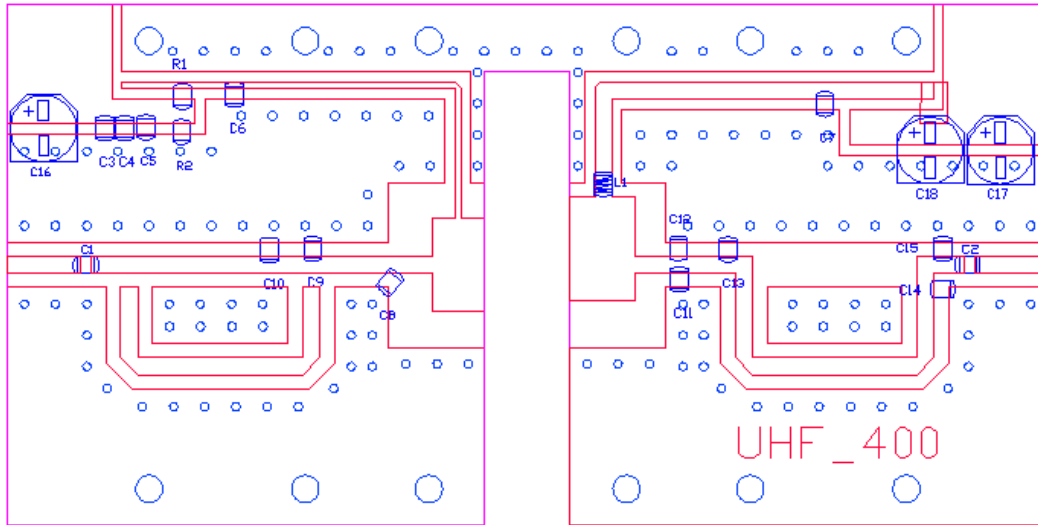


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Demonstration Board Outline

Demonstration Circuit Board Picture

Part	Description	Part Number	Manufacturer
C1,C2,C6,C7 :	220 pF ATC 100B Chip Capacitor	100B221JP500X	ATC
C3	1.0 uF, 100V Chip Capacitor (X7R 1210)	GRM32ER72A105MA01L	Murata
C4	10K pF 100V Chi Capacitor (X7R 1206)	C1206C103K1RACTU	Kemet
C5	1K pF 100V Chi Capacitor (X7R 1206)	C1206C102K1RACTU	Kemet
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
C9:	15.0 pF ATC 100B Chip Capacitor	100B150JP500X	ATC
C10:	3.9 pF ATC 100B Chip Capacitor	100B3R9JP500X	ATC
C11,C12:	12 pF ATC 100B Chip Capacitor	100B120JP500X	ATC
C13:	24.0 pF ATC 100B Chip Capacitor	100B240JP500X	ATC
C14:	10 pF ATC 100B Chip Capacitor	100B100JP500X	ATC
C15:	1.0 pF ATC 100B Chip Capacitor	100B1R0JP500X	ATC
C16:	10uF 63V Elect FK SMD	PCE3479CT-ND	Digi Key
L1	43 nH Coilcraft mini spring Inductor	B10T_L_	Coil craft
C17, C18:	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	DS2525	DS Electronics
Heat Sink	Cool Innovations Aluminum Heat Sink		Cool Innovation
Device Clamp	Cool Innovations Nylon Clamp Foot	FXT000158 Rv.B	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

(AutoCAD Files for Demonstration Board available online at [www.hvvi.com/products](http://www.hvvi.com/products))

HVV0405-175 Demonstration Circuit Board Bill of Materials

