

FEATURES

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

PACKAGE



TYPICAL PERFORMANCE

At Pin (W)	FREQUENCY (MHz)	VDD (V)	IDQ (mA)	Power (W)	GAIN (dB)	η (%)	IRL (dB)	VSWR
12	1150	50	100	640	17.3	48	-12	20:1

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

DESCRIPTION

The high power HVV1012-550 device is an enhancement mode RF MOSFET power transistor designed for pulsed applications in the L-Band from 1025MHz to 1150MHz. The high voltage MOSFET technology produces over 550W 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: HVV1012-550
Evaluation Kit Part Number: HVV1012-550-EK

HVV1012-550 High Voltage, High Ruggedness

L-Band High Power Pulsed Transistor

1025-1150 MHz, 10μs Pulse, 1% Duty

For Airborne DME Applications

ABSOLUTE MAXIMUM RATING (IEC 134)

THERMAL/RUGGEDNESS PERFORMANCE

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	95	V
V _{GSS}	Gate-Source Voltage	-10, 10	V
I _{DS(max)}	Drain Current	40	A
P _D ¹	Power Dissipation	5000	W
P _{in}	Input Power	28	W
T _S	Storage Temperature	-40 to +150	°C
T _J	Junction Temperature	200	°C

Symbol	Parameter	Max	Unit
θ _{JC} ²	Thermal Resistance	0.03	°C/W

Symbol	Parameter	Test Condition	Max	Units
LMT ²	Load Mismatch Tolerance	F = 1150 MHz	20:1	VSWR

The HVV1012-550 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	-	100	400	μA
I _{GSS}	Gate Leakage Current	V _{GS} =5V, V _{DS} =0V	-	2	10	μA
G _p ²	Power Gain	F=1025, 1150MHz, Pin=12W	16.5	17.3	-	dB
IRL ²	Input Return Loss	F=1025, 1150MHz, Pin=12W	-	-12	-7	dB
η _D ²	Drain Efficiency	F=1025, 1150MHz, Pin=12W	44	48	-	%
P _{out}	Power out	F=1150MHz, Pin=12W	-	640	-	W
V _{GS(Q)} ³	Gate Quiescent Voltage	V _{DD} =50V, I _{DQ} =100mA	1.0	1.4	1.7	V
V _{TH}	Threshold Voltage	V _{DD} =5V, I _D =300μA	0.7	1.2	1.7	V

Typical performance at 1025MHz with an input power of 12W.

G _p ²	Power Gain	F=1025MHz, Pin=12W	-	17	-	dB
IRL ²	Input Return Loss	F=1025MHz, Pin=12W	-	-11	-	dB
η _D ²	Drain Efficiency	F=1025MHz, Pin=12W	-	54	-	%
P _{out}	Power out	F=1025MHz, Pin=12W	-	640	-	W

HVV1012-550 High Voltage, High Ruggedness

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1025-1150 MHz, 10μs Pulse, 1% Duty

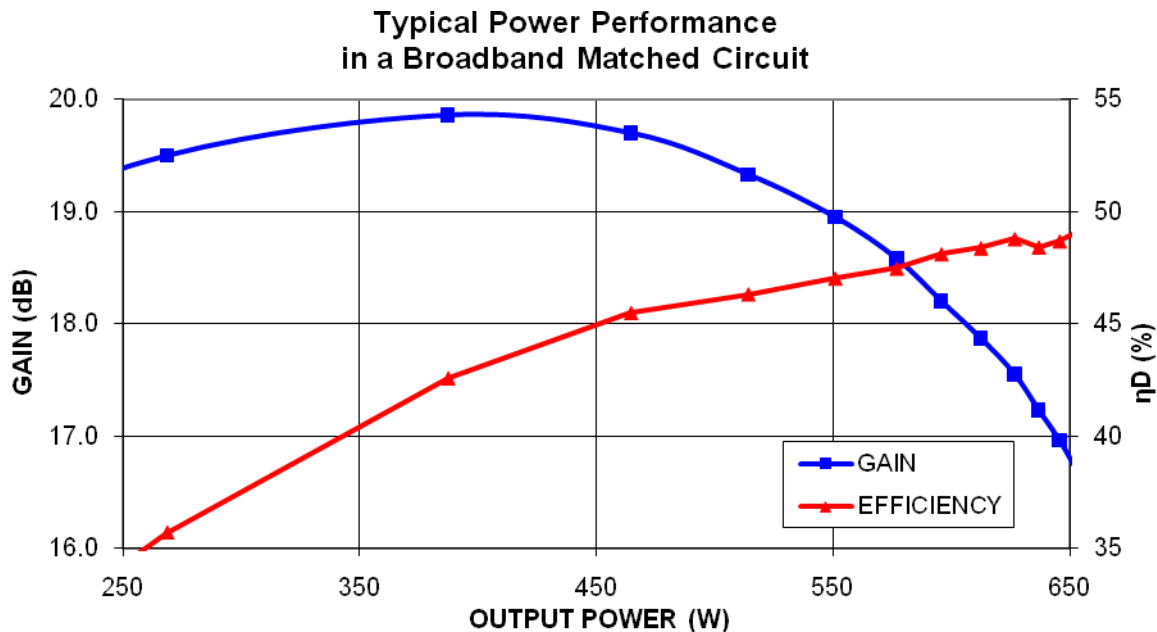
For Airborne DME Applications

PULSE CHARACTERISTICS

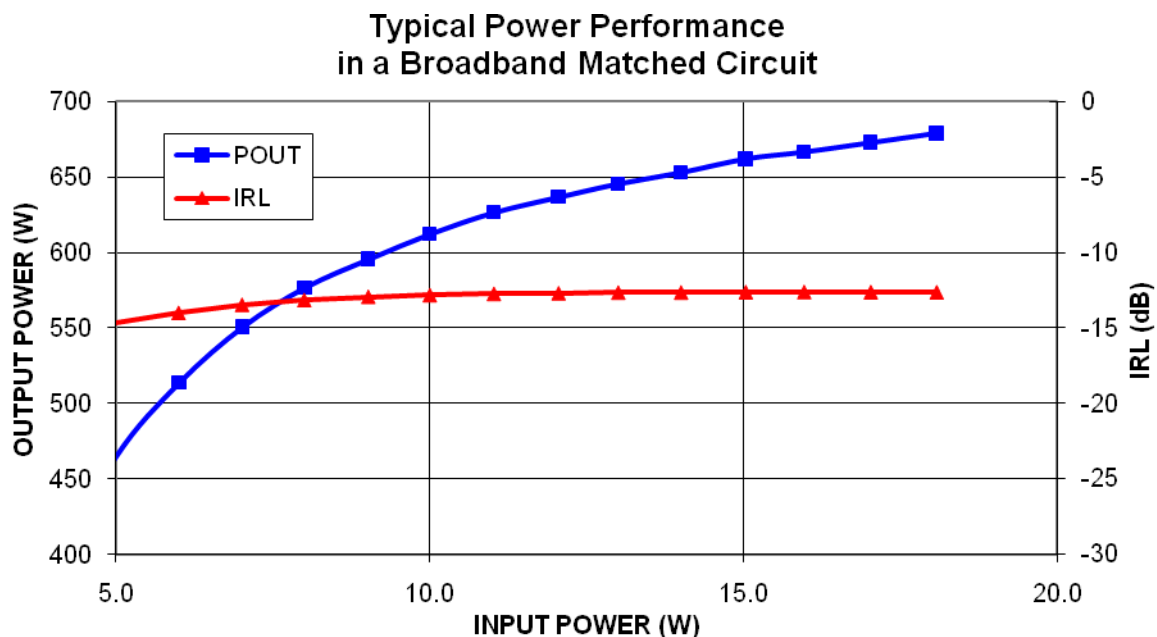
Symbol	Parameter	Conditions	Min	Typical	Max	Units
t _r ⁴	Rise Time	F=1150MHz	-	<35	50	ns
t _f ⁴	Fall Time	F=1150MHz	-	<15	50	ns
PD ⁴	Pulse Droop	F=1150MHz	-	0.1	0.3	dB

- Notes:
- 1) Rated at $T_{CASE} = 25^{\circ}C$
 - 2) All parameters measured under pulsed conditions at 12W input power measured at the 10% point of the pulse with pulse width = 10μsec, duty cycle = 1% and $V_{DD} = 50V$, $I_{DQ} = 100mA$ in a broadband matched test fixture.
 - 3) Amount of gate voltage required to attain nominal quiescent current.
 - 4) Guaranteed by design.

HVV1012-550 High Voltage, High Ruggedness
L-Band High Power Pulsed Transistor
1025-1150 MHz, 10μs Pulse, 1% Duty
For Airborne DME Applications



Typical device performance under Class AB mode of operation and RF pulse conditions of 10μs pulse width and 1% duty cycle with $V_{DD} = 50V$ and $I_{DQ} = 100mA$. The device was measured at 1150MHz.



Typical device performance under Class AB mode of operation and RF pulse conditions of 10μs pulse width and 1% duty cycle with $V_{DD} = 50V$ and $I_{DQ} = 100mA$. The device was measured at 1150MHz.

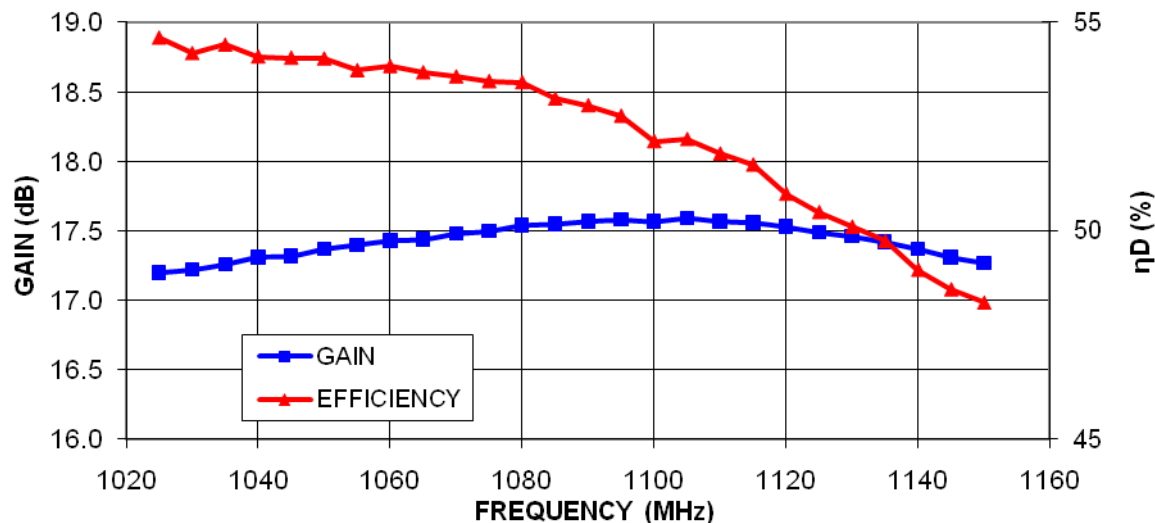
HVV1012-550 High Voltage, High Ruggedness

L-Band High Power Pulsed Transistor

1025-1150 MHz, 10μs Pulse, 1% Duty

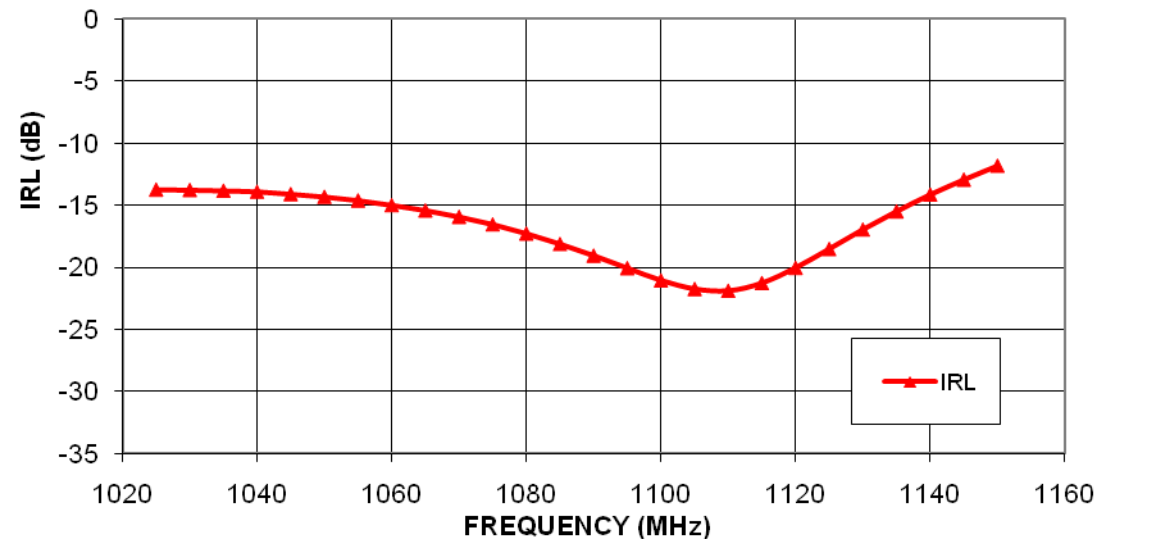
For Airborne DME Applications

Typical Performance vs Frequency
in a Broadband Matched Circuit



Typical device performance under Class AB mode of operation and RF pulse conditions of 10μs pulse width and 1% duty cycle with $V_{DD} = 50V$ and $I_{DQ} = 100mA$. The device was measured at an input power of 12W.

Typical Performance vs Frequency
in a Broadband Matched Circuit



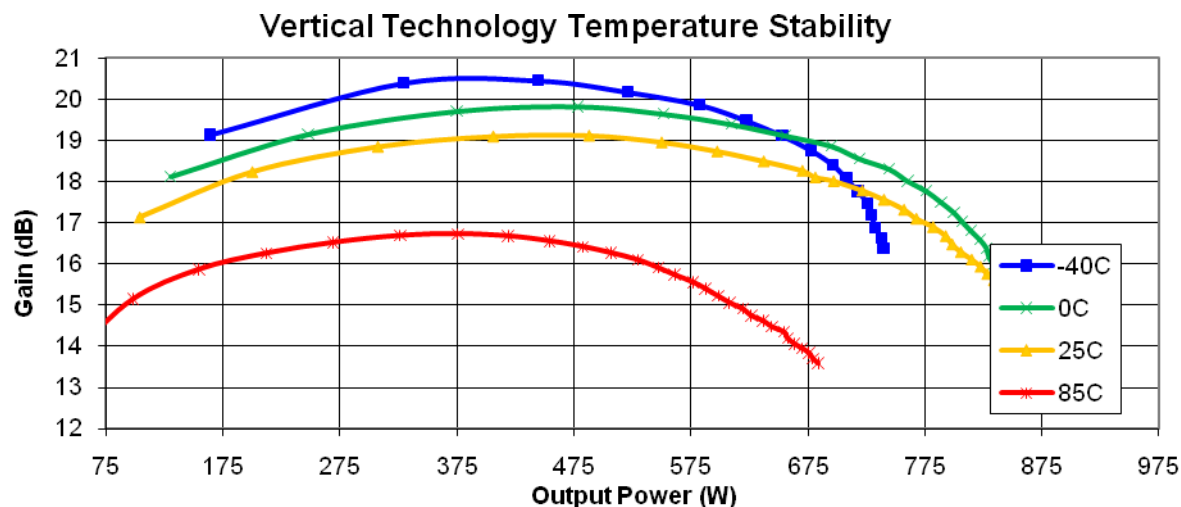
Typical device performance under Class AB mode of operation and RF pulse conditions of 10μs pulse width and 1% duty cycle with $V_{DD} = 50V$ and $I_{DQ} = 100mA$. The device was measured at an input power of 12W.

HVV1012-550 High Voltage, High Ruggedness

L-Band High Power Pulsed Transistor

1025-1150 MHz, 10μs Pulse, 1% Duty

For Airborne DME Applications



Typical device performance under Class AB mode of operation at 1090MHz and RF pulse conditions of 10μs pulse width and 1% duty cycle with VDD = 50 V and IDQ = 100mA. The high voltage silicon vertical technology shows less than 1.5dB 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	19.5	622	57.9
0C	18.9	695	58.4
25C	18.1	681	58.3
85C	15.7	561	57.5

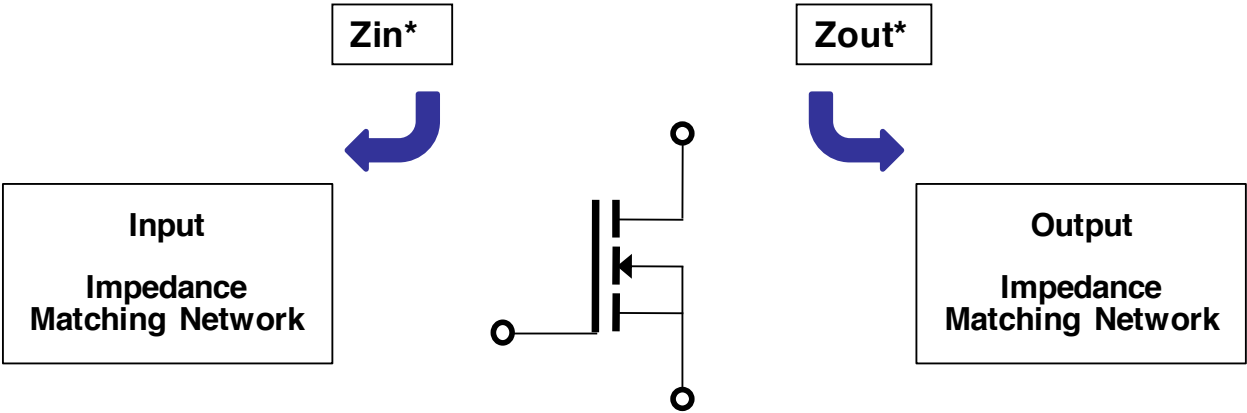
HVV1012-550 Performance over Temperature

HVV1012-550 High Voltage, High Ruggedness

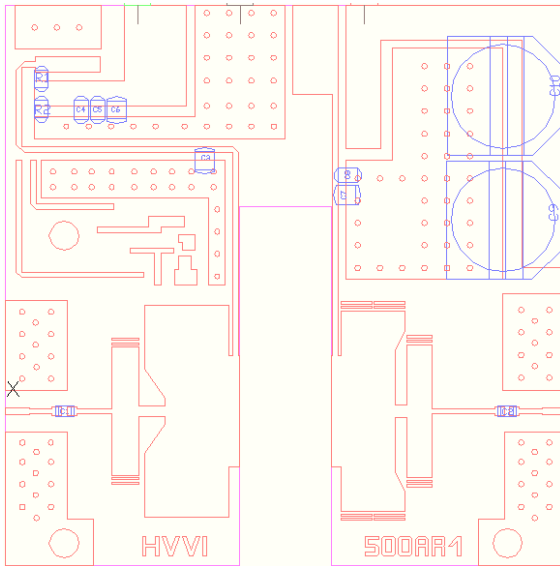
L-Band High Power Pulsed Transistor
1025-1150 MHz, 10μs Pulse, 1% Duty
For Airborne DME Applications

Test Circuit Impedances

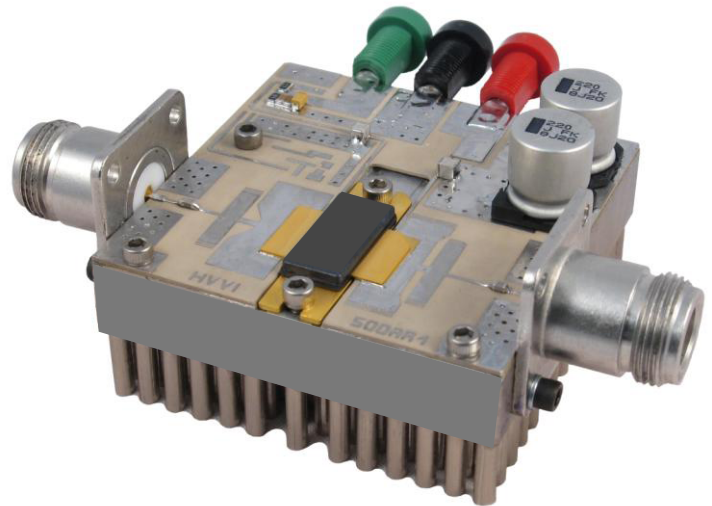
Frequency	Zin* (ohms)	Zout* (ohms)
1025MHz	0.95-j1.4	1.2-j2.8
1060MHz	0.97-j1.2	1.1-j2.5
1150MHz	1.1-j0.66	1.0-j1.9



HVV1012-550 High Voltage, High Ruggedness *L-Band High Power Pulsed Transistor* *1025-1150 MHz, 10 μ s Pulse, 1% Duty* *For Airborne DME Applications*



Demonstration Board Outline

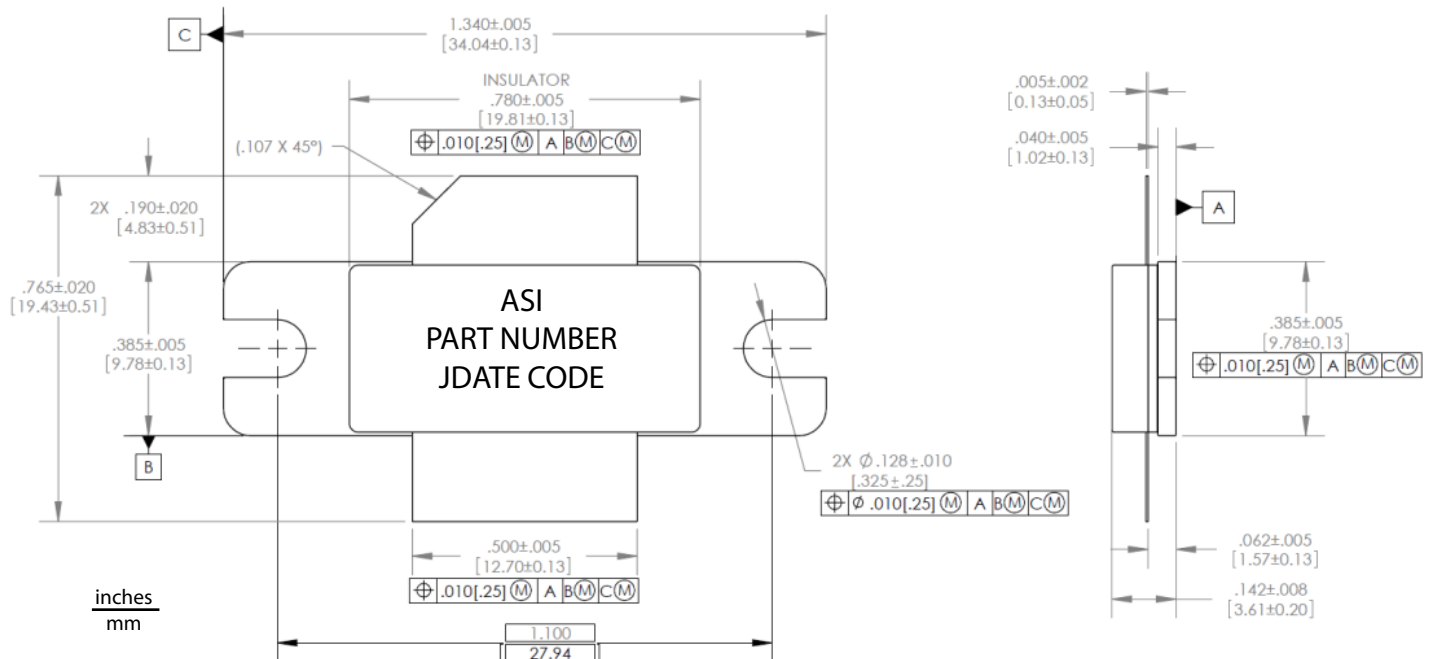


Demonstration Circuit Board Picture

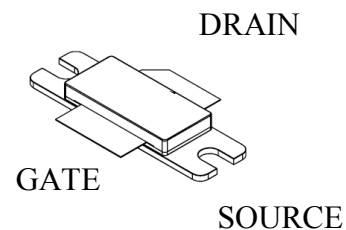
Part	Description	Part Number	Manufacturer
C1, C2:	39 pF AVX 805 Chip Capacitor	712-1388-1-ND	Digi Key
C3,C7:	39 pF ATC 1210 100B Chip Capacitor	478-2646-1-ND	Digi Key
C4:	1K pF 100V Chip Capacitor (X7R 1206)	399-1222-2-ND	Digi Key
C5, C8:	10K pF 100V Chip Capacitor (X7R 1206)	399-1236-2-ND	Digi Key
C6:	10 uF 6V Tantalum SMD	478-3134-1-ND	Digi Key
C9, C10:	220 uF 63V Elect FK SMD	PCE3484TR-ND	Digi Key
R1:	470 Ohms Chip Resistor (1206)	311-470ERCT-ND	Digi Key
R2:	100 K Ohms Chip Resistor (1206)	311-100KERCT-ND	Digi Key
RF Connectors	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: 25 mils thick, 10.2 Dielectric, 1 oz Copper		DS Electronics
Device Clamp	HV800 Package Nylon Clamp Foot	FXT000116	Cool Innovation
Heat Sink	Cool Innovations Aluminum Heat Sink	3-252510RS3411	Cool Innovation
S.S. Screws (4)	4-40 X 1/4 Stainless Steel Socket Hex Head	P242393	Copper State Bolt
Alloy Screws (4)	4-40 X 1/2 Alloy Socket Cap screw Hex	SCAS-0440-08C	Small Parts Inc
Metal Washer (6)	#4 Washer Zinc PLTD Steel Lock	ZSLW-004-M	Small Parts Inc
Alloy Screws (2)	4-40 X 3/4 Alloy Socket Cap Screw Head	SCAS-0440-12M	Small Parts Inc

HVV1012-550 Demonstration Circuit Board Bill of Materials

PACKAGE DIMENSIONS



Note: Drawing is not actual size.



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