■ Features

- High Power GaN HEMT for DC to 3.5GHz
- High Power: 67W @ 3.5GHz
- High Efficiency: 60% @ 3.5GHz
- Broad Band Operation
- Small Flangeless Package

■ Description

Sumitomo Electric's GaN-HEMT SGCB056M1H-R offers high power, high efficiency, ease of matching and greater consistency for DC to 3.5GHz Radar applications with 50V operation. SGCB056M1H-R is suitable for broadband applications.

ABSOLUTE MAXIMUM RATING (Case Temperature Tc=25 deg.C)

Item	Symbol	Rating	Unit
Operating Voltage	V_{DS}	55	V
Drain-Source Voltage	V_{DS}	160 @ V_{GS}-8V	V
Gate-Source Voltage	V_{GS}	-15	V
Storage Temperature	T_{stg}	-55 to +125	deg.C
Channel Temperature	T_{ch}	+250	deg.C

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
Drain-Source Voltage	V_{DS}		<=50	V
Forward Gate Current	I_{GF}	Rg=51ohm	<=30.8	mA
Reverse Gate Current	I_{GR}	Rg=51ohm	<=-2.2	mA
Channel Temperature	T_{ch}		<=200	deg.C
Output Power	P_{out}		<=P5dB	dBm

ELECTRICAL CHARACTERISTICS (Case Temperature T_c=25 deg.C)

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-off Voltage	V_P	V_{DS}=50V, I_{DS}=8.8mA	-3.45	-	-2.45	V
Output Power	P_{out}	V_{DS}=50V, $I_{DS(DC)}$=130mA, Pin=36dBm, f=3.5GHz, PW=200µsec, Duty=10%	47.5	48.3	-	dBm
Drain Efficiency	DE		-	60	-	%
Power Gain	G_P		11.5	12.3	-	dB
Load Mismatch Ruggedness	VSWR		-	10:1	-	dB
Thermal Resistance	R_{th}	Channel to Case at 50W P_{DC}	-	2.2	2.64	deg.C/W

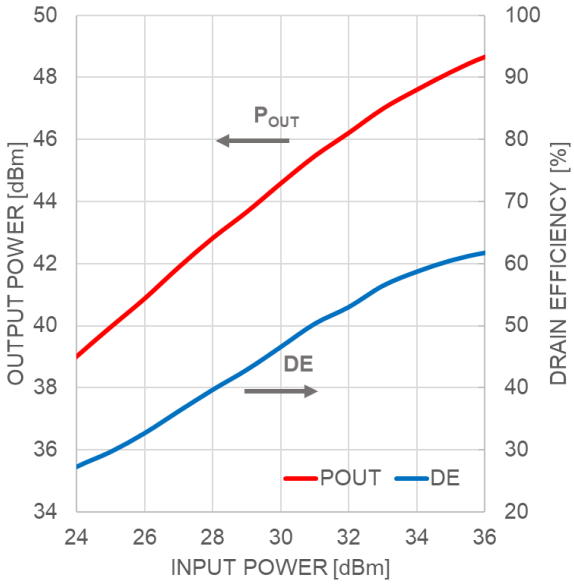
Case Style	M1H
RoHS Compliance	YES
ESD (*1)	Class 1C (1000v to < 2000v)

(*1) Based on ANSI/ESDA/JEDEC JS-001 (C=100pF, R=1.5kohm)

■ RF Characteristics

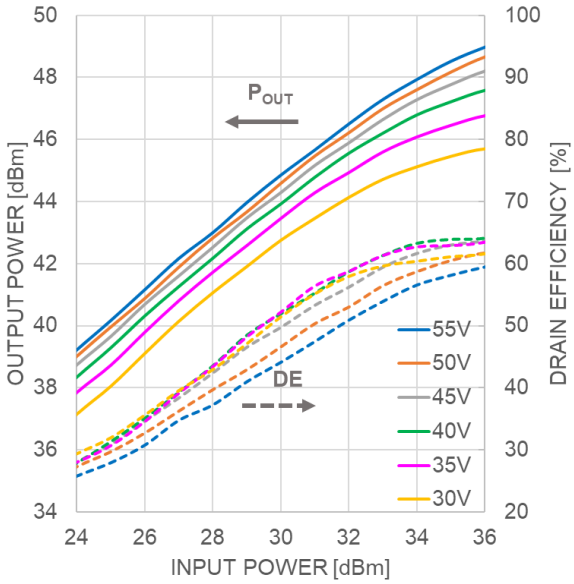
Output Power, Drain Efficiency vs. Input Power

f=3.5GHz, V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



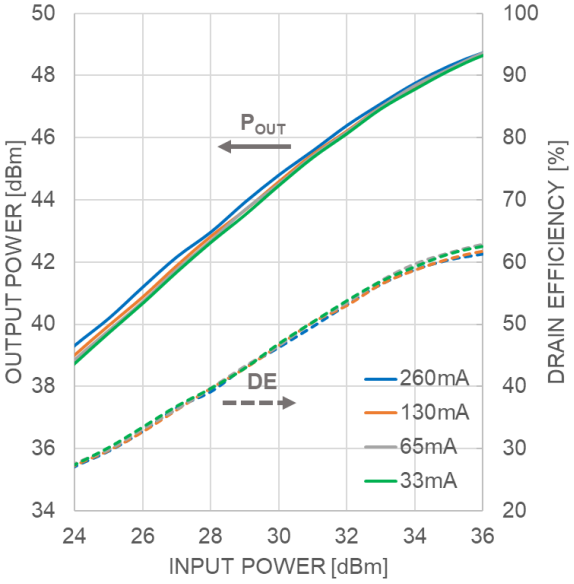
Output Power, Drain Efficiency vs. Input Power by Drain Voltage

f=3.5GHz, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



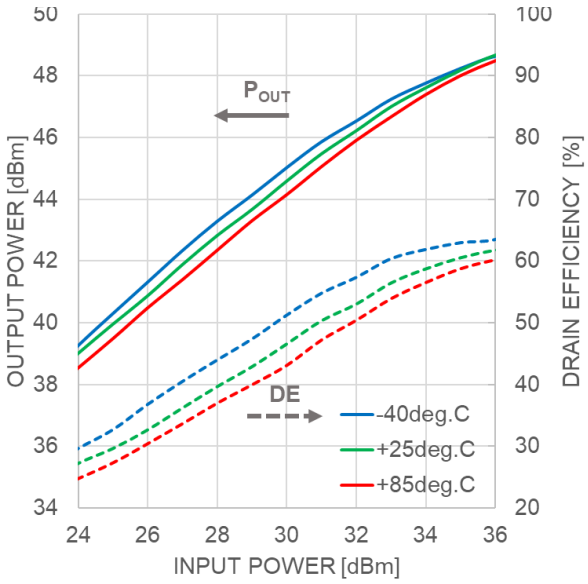
Output Power, Drain Efficiency vs. Input Power by Drain Current

f=3.5GHz, V_{DS}=50V
PW=200µsec., Duty=10%

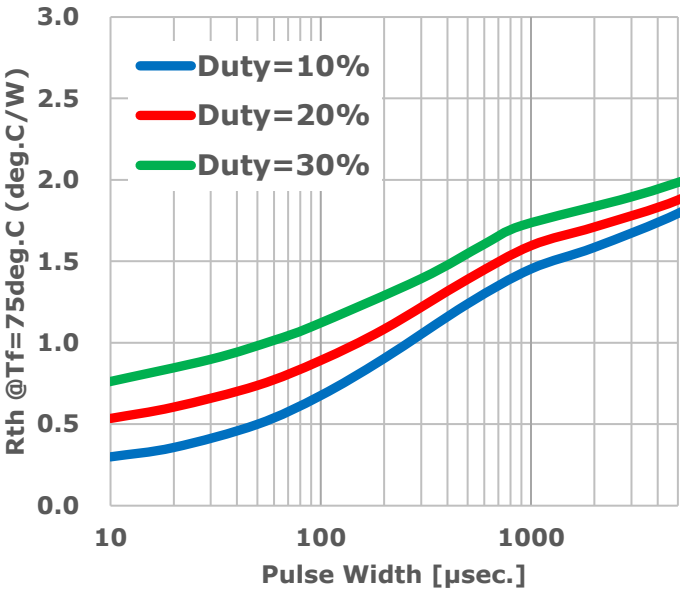


Output Power, Drain Efficiency vs. Input Power by case temperature

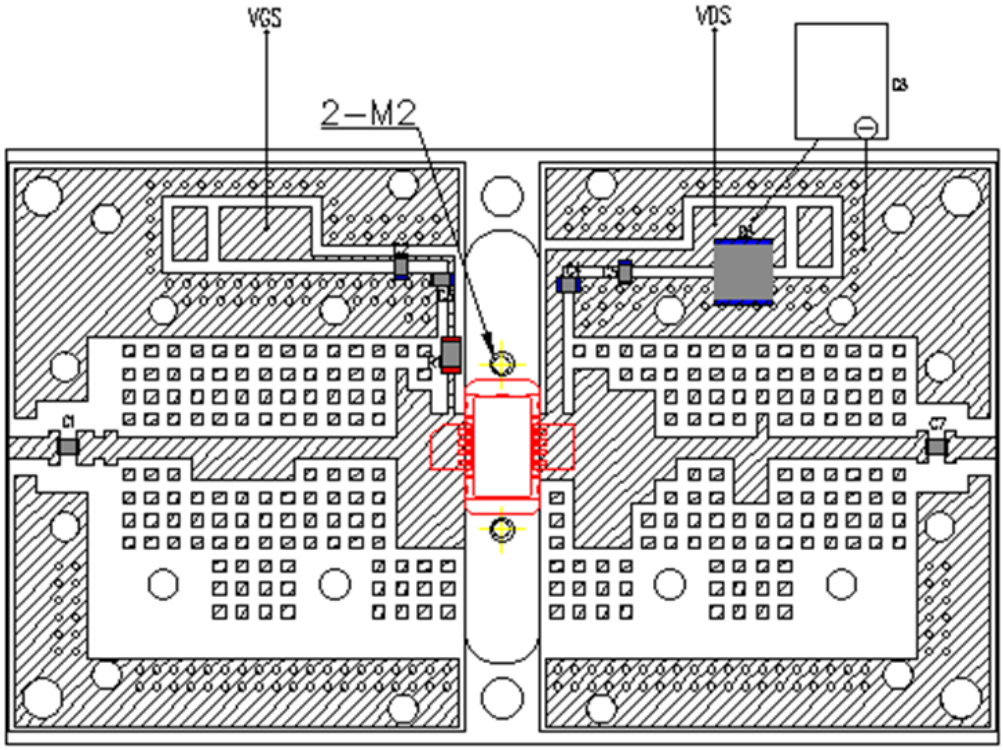
f=3.5GHz, V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



■ Thermal Characteristics In Pulsed Operation



■ Matching circuit example for 3.1 to 3.5GHz



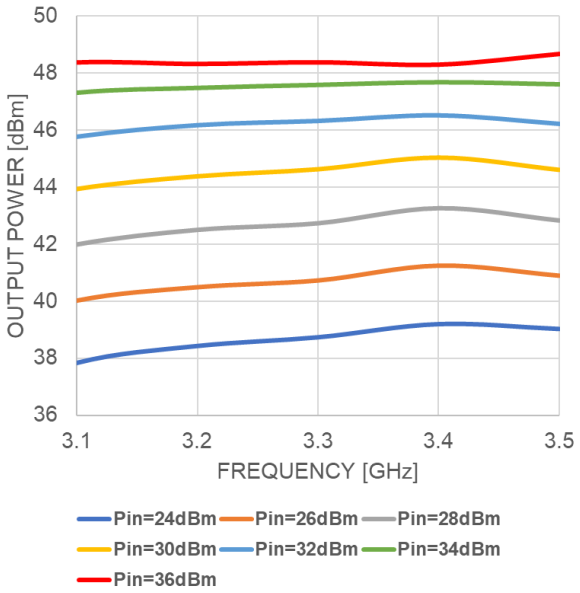
Part	Description
C1,C3,C4,C7	10pF Chip Capacitor
C2,C5	1000pF Chip Capacitor
C6	4.7μF Chip Capacitor
C8	470μF 80V Electrolytic Capacitor
R1	51Ω 1/2W Chip Resistor
PCB	t=0.8mm, εr=3.5,Cu thickness=18μm

Note) DXF file of this PCB is available.

■ Electrical characteristics (Using the matching circuit on page 4)

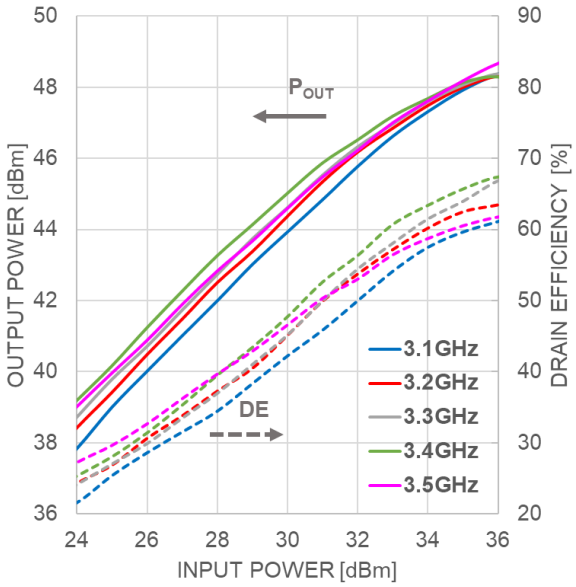
Output Power vs. Frequency

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200μsec., Duty=10%



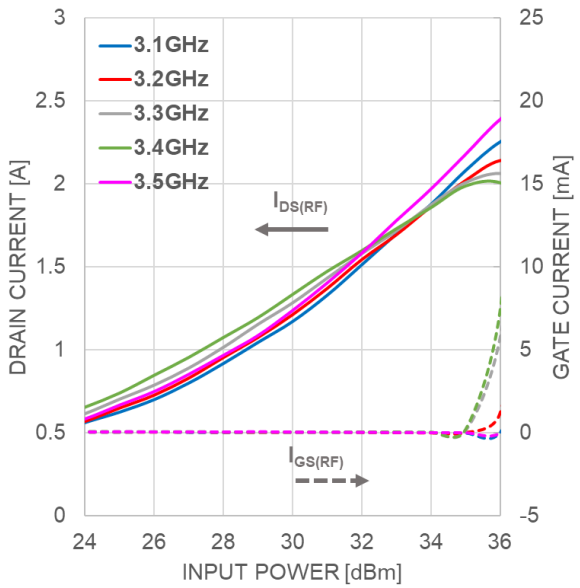
Output Power, Drain Efficiency vs. Input Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200μsec., Duty=10%



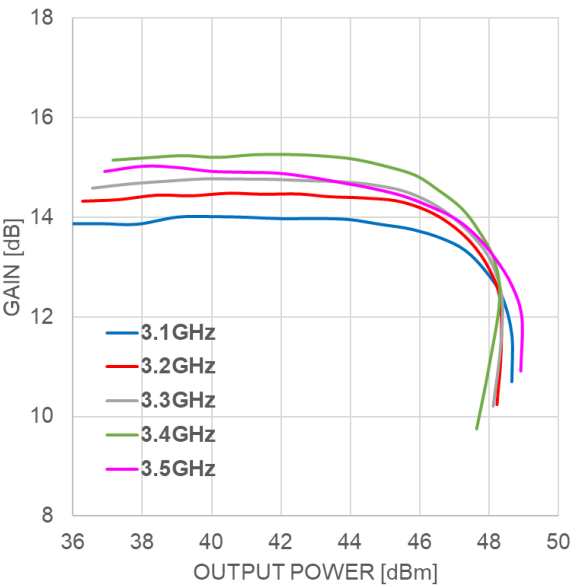
Drain current, Gate Current vs. Input Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200μsec., Duty=10%



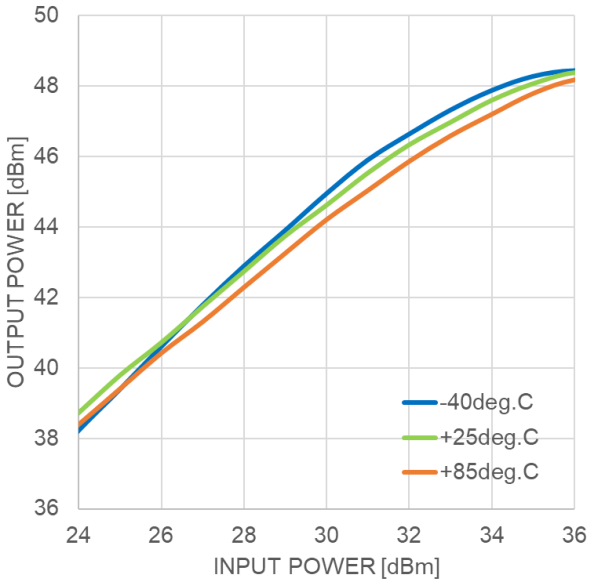
Gain vs. Output Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200μsec., Duty=10%

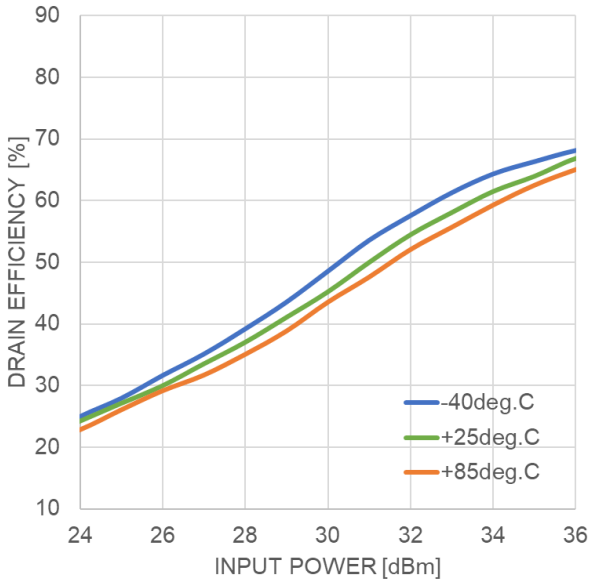


■ Electrical characteristics (Using the matching circuit on page 4)

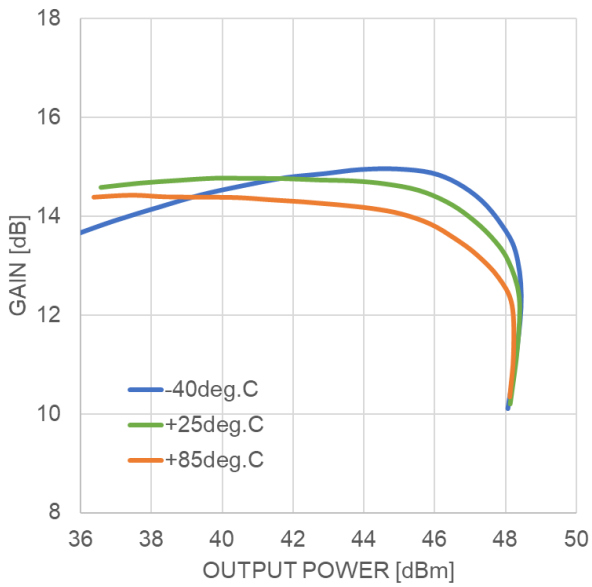
Output Power vs. Input Power
By case temperature
f=3.3GHz, V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



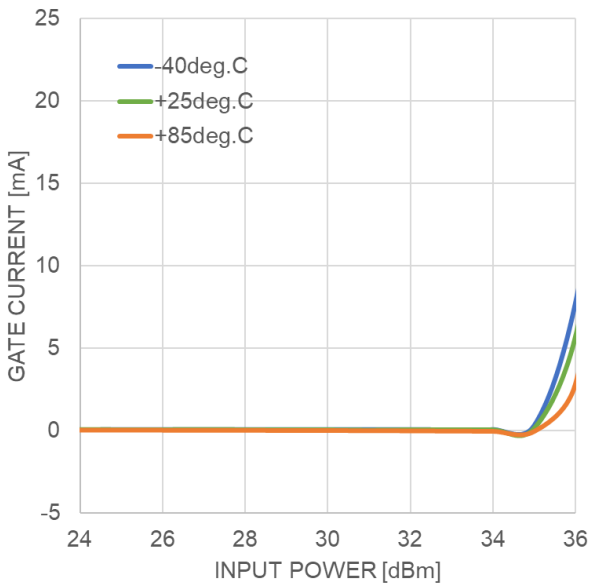
Drain Efficiency vs. Input Power
By case temperature
f=3.3GHz, V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



Gain vs. Output Power
by case temperature
f=3.3GHz, V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%

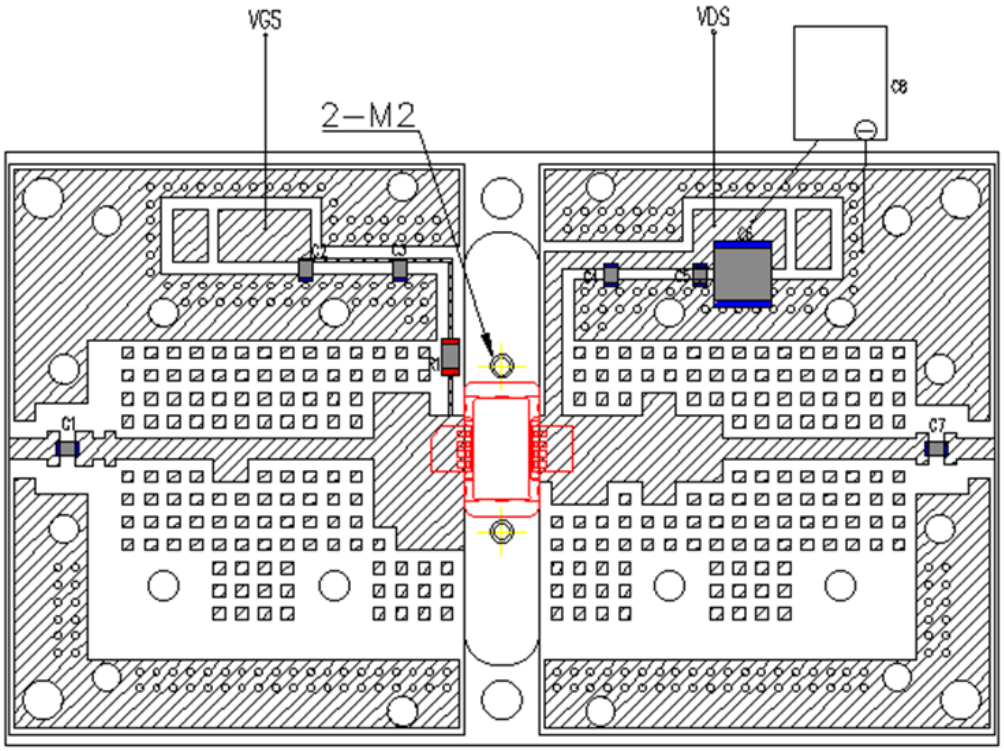


Gate Current vs. Input Power
by case temperature
f=3.3GHz, V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



Note) V_{GS} is fixed at the set value of $I_{DS(DC)}$@T_c=+25deg.C

■ Matching circuit example for 2.7 to 3.1GHz



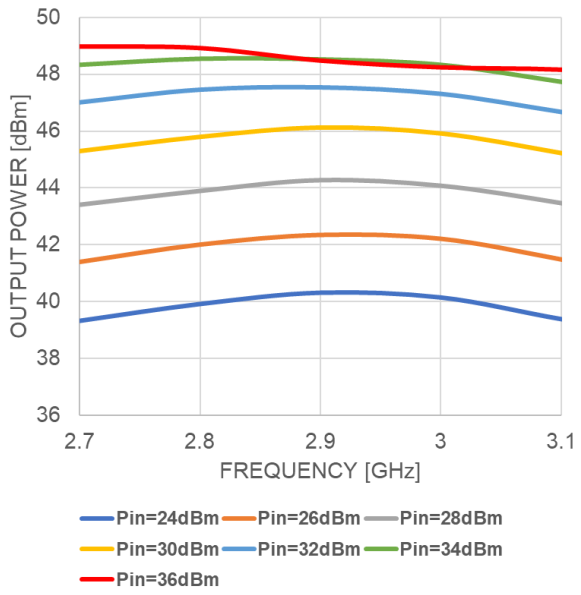
Part	Description
C1,C3,C4,C7	10pF Chip Capacitor
C2,C5	1000pF Chip Capacitor
C6	4.7μF Chip Capacitor
C8	470μF 80V Electrolytic Capacitor
R1	51Ω 1/2W Chip Resistor
PCB	t=0.8mm, εr=3.5,Cu thickness=18μm

Note) DXF file of this PCB is available.

■ Electrical characteristics (Using the matching circuit on page 7)

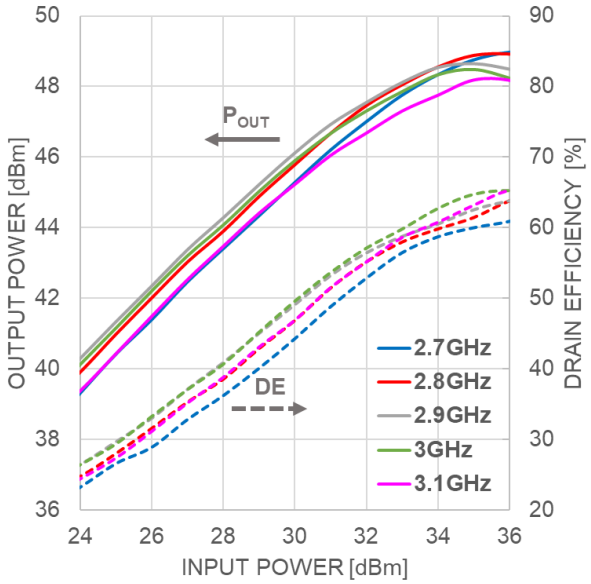
Output Power vs. Frequency

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



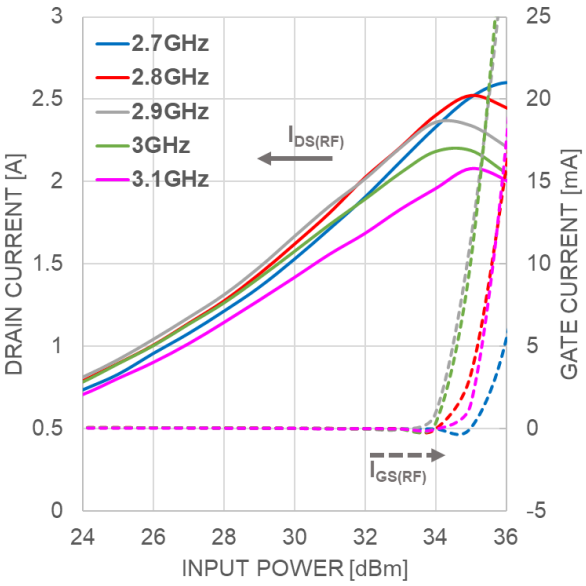
Output Power, Drain Efficiency vs. Input Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



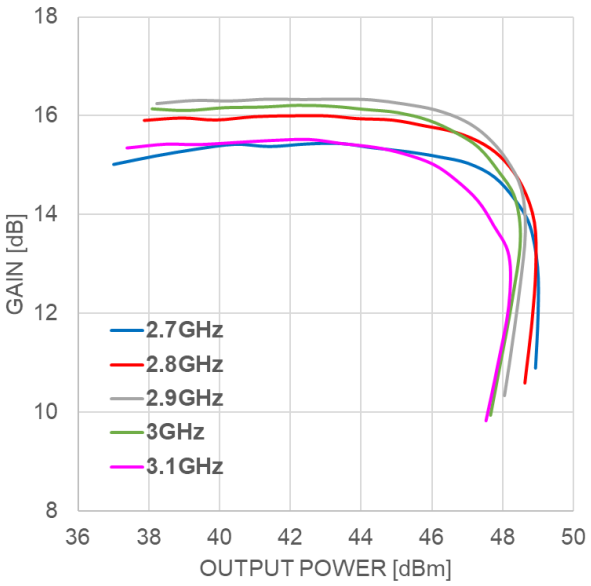
Drain current, Gate Current vs. Input Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%

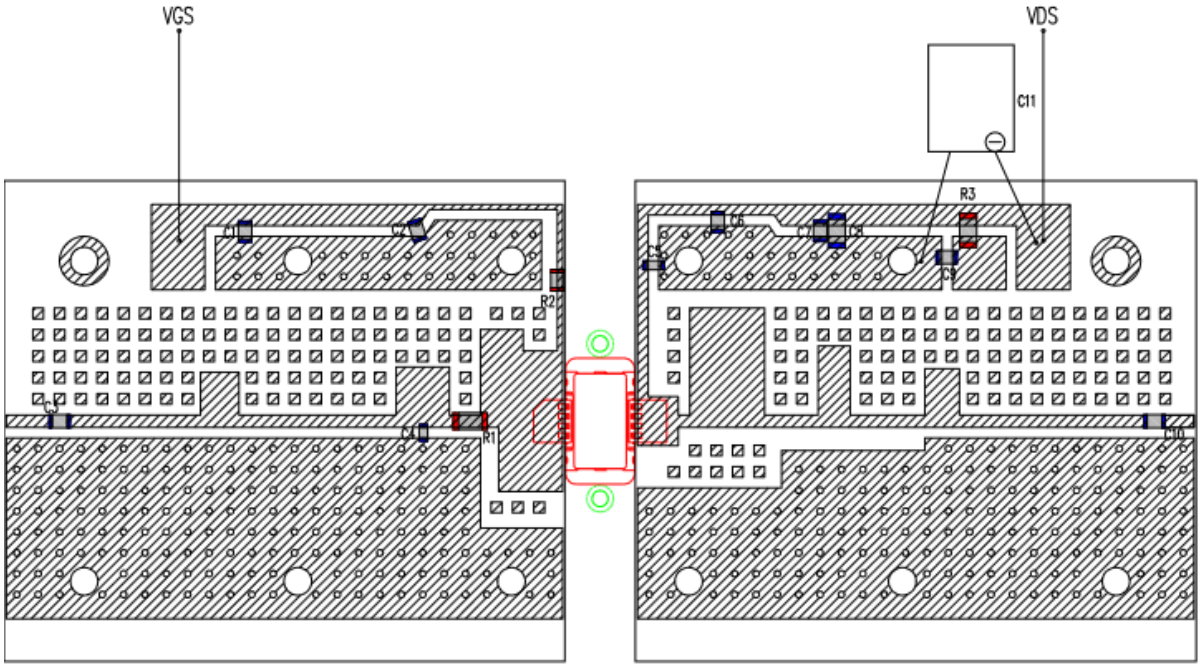


Gain vs. Output Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



■ Matching circuit example for 1.2 to 1.4GHz



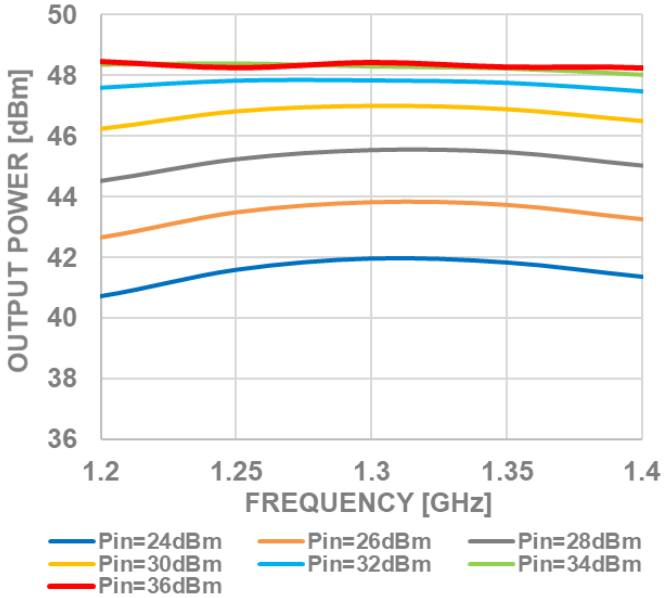
Part	Description
C1,C7,C9	1000pF Chip Capacitor
C2,C3,C6,C10	20pF Chip Capacitor
C4	2.7pF Chip Capacitor
C5	10pF Chip Capacitor
C8	0.22μF Chip Capacitor
C11	470μF 80V Electrolytic Capacitor
R1	3Ω Chip Resistor
R2	51Ω Chip Resistor
R3	10Ω Chip Resistor
PCB	t=1.27mm, εr=10.2,Cu thickness=18μm

Note) DXF file of this PCB is available.

■ Electrical characteristics (Using the matching circuit on page 9)

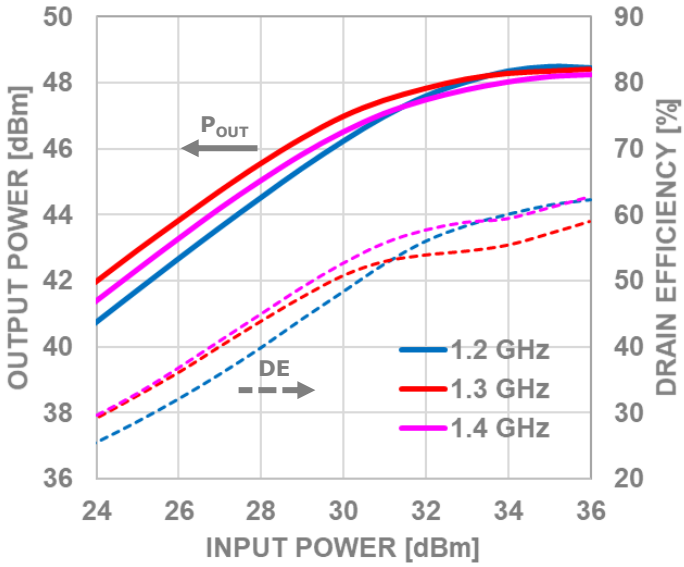
Output Power vs. Frequency

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



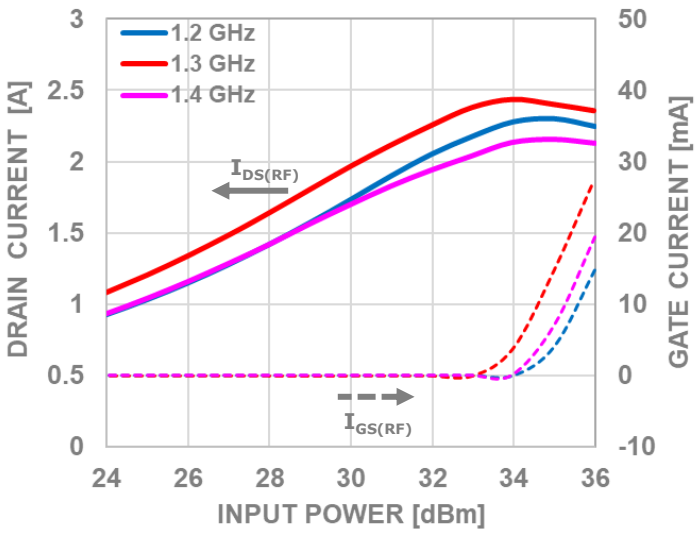
Output Power, Drain Efficiency vs. Input Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



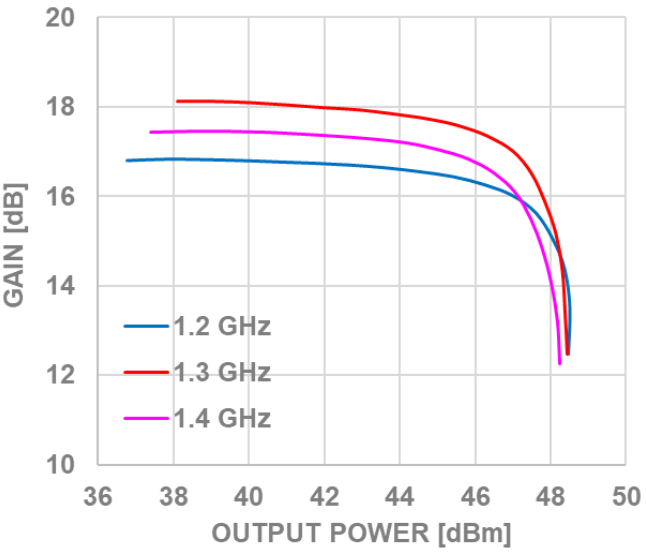
Drain current, Gate Current vs. Input Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



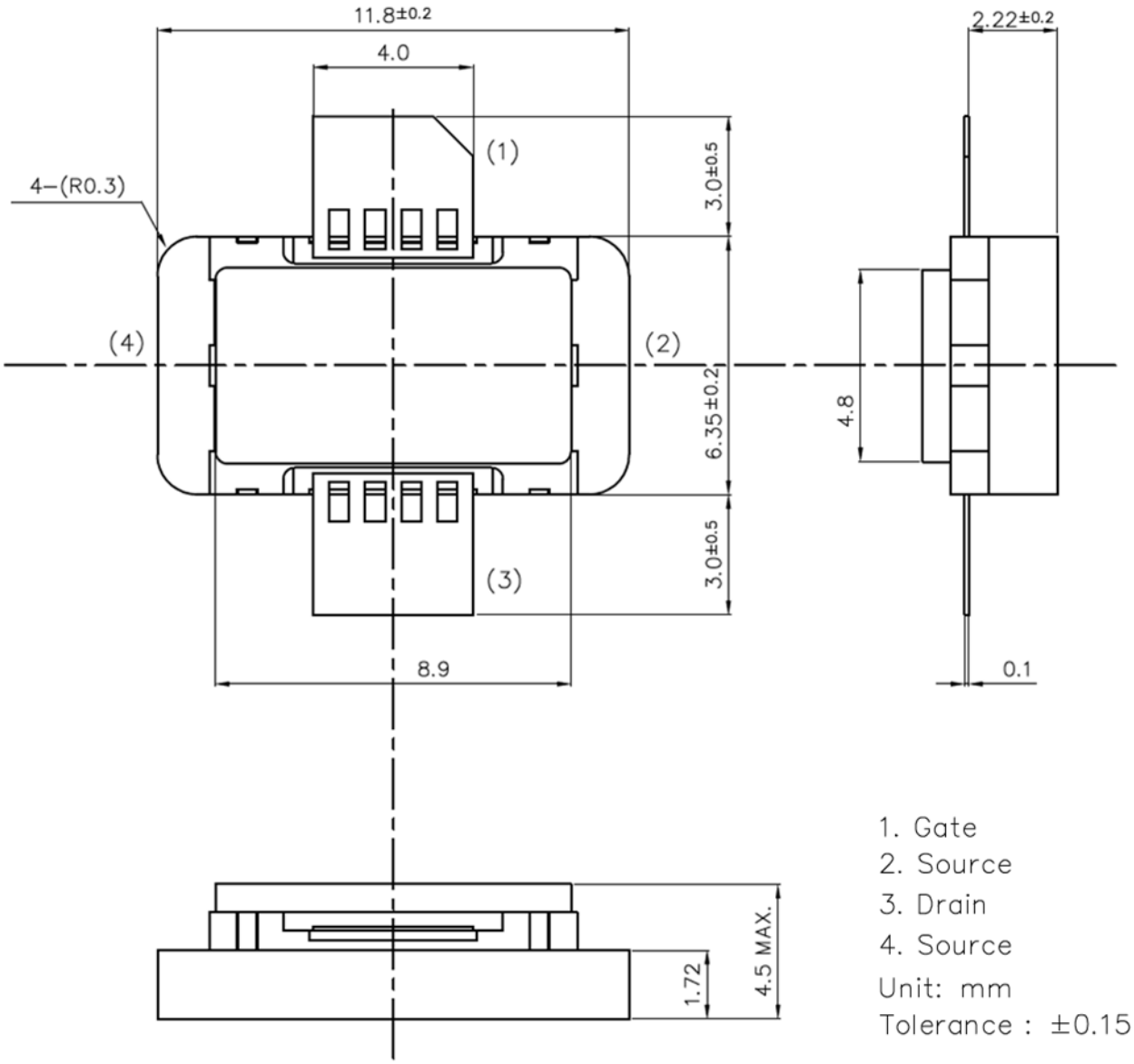
Gain vs. Output Power

V_{DS}=50V, $I_{DS(DC)}$=0.13A
PW=200µsec., Duty=10%



■ Package Outline

Case Style : M1H
Metal-Ceramic Hermetic Package



For Safety, Observe the Following Procedures Environmental Management

- Do not put this product into the mouth.
- Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.
- Respect all applicable laws of the country when discarding this product.
  This product must be disposed in accordance with methods specified by applicable hazardous waste procedures.

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- **YOU SHALL BE RESPONSIBLE FOR ALL LOSSES, EXPENSES, OR DAMAGES RESULTING FROM ANY DEFECTS IN THE SEG PRODUCTS ARISING FROM YOUR HANDLING, ASSEMBLY AND IMPLEMENTATION PROCESS.**

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transport control, medical life support system, missile launch control in weapon system), or (2) for use requiring extremely high reliability (i.e., submersible repeater and artificial satellite).
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