



Product Features

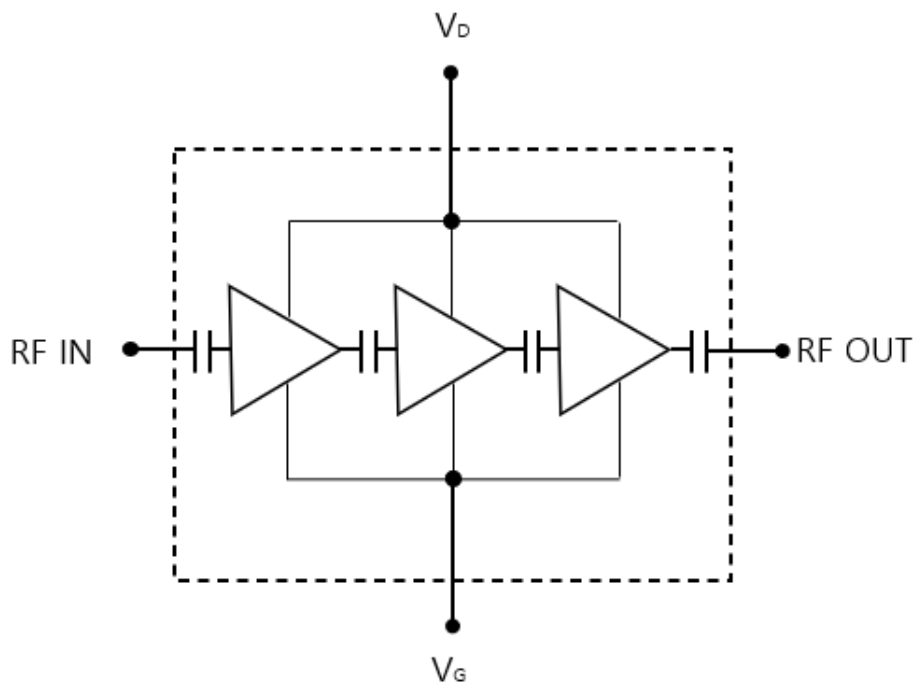
- 13.75-14.5GHz GaN MMIC Power Amplifier
- Typical Small-signal Gain 24dB
- Typical Power Gain 19.1dB
- Typical Output Power 49.6dBm
- Typical PAE 30.3%
- 45V-50V operation
- * Above Typical values measured at 14GHz and 45V



Applications

- General Purpose
- Communication System
- Radar System
- Satellite Communication

Block Diagram





Absolute Maximum Rating

Parameter	Symbol	Rating	Units	Conditions
Drain-Source Voltage	V _{DSS}	120	Volts	25°C
Gate-to-Source Voltage ³	V _{GS}	-10, +2	Volts	25°C
Storage Temperature ³	T _{STG}	-65, +150	°C	
Operating Junction Temperature ^{1,3}	T _J	225	°C	
Maximum Forward Gate Current ³	I _{GMAX}	10	mA	25°C
Maximum Drain Current ²	I _{DMAX}	1.04	A	I _d @ V _d =10V, V _g = 1V
Soldering Temperature ³	T _s	245	°C	

1. Continuous use at maximum temperature will affect MTTF.
2. Current limit for long term, reliable operation.
3. After additional updates.

Specifications (T_A=25°C, F₀=14GHz, V_{DD}=45V, I_{DQ}=460mA)

Parameter	Symbol	MIN	TYP	MAX	Units	Conditions
Small Signal Gain	G		24		dB	Pulse Width=100μsec, Duty Cycle=10%
Power Gain	G _P		19.1		dB	P _{sat} @ I _{gs} =1mA
Saturated Output Power	P _{OUT}		49.6		dBm	P _{sat} @ I _{gs} =1mA
Power Added Efficiency	PAE		30.3		%	P _{sat} @ I _{gs} =1mA

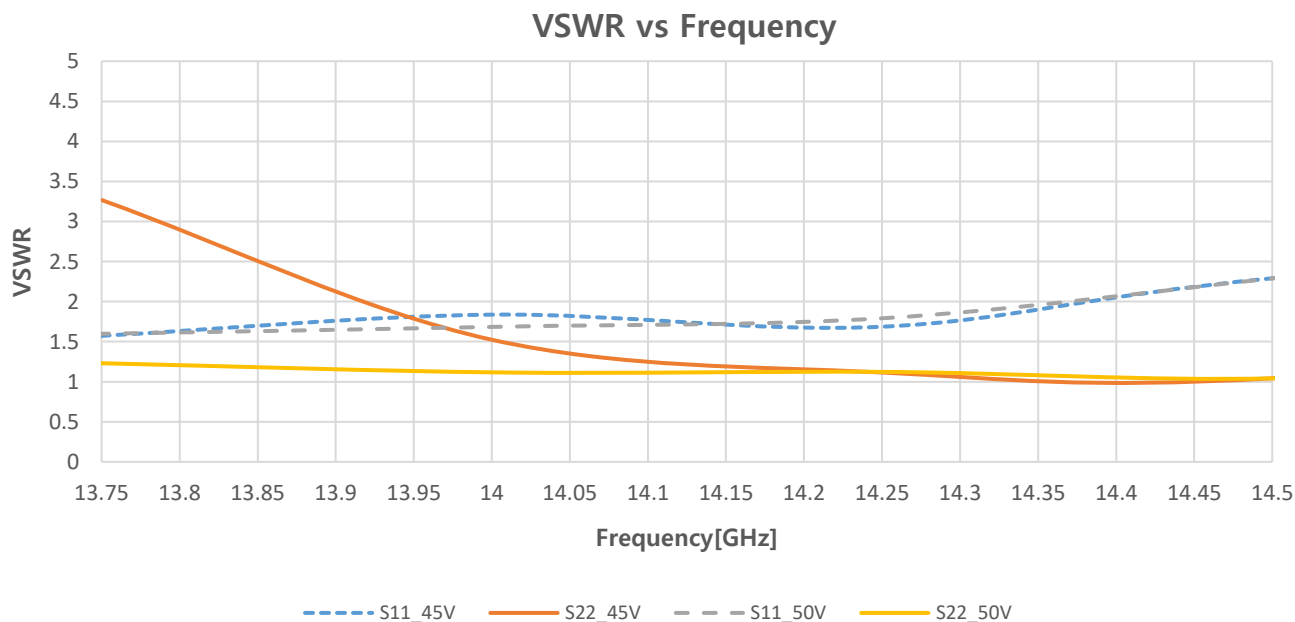
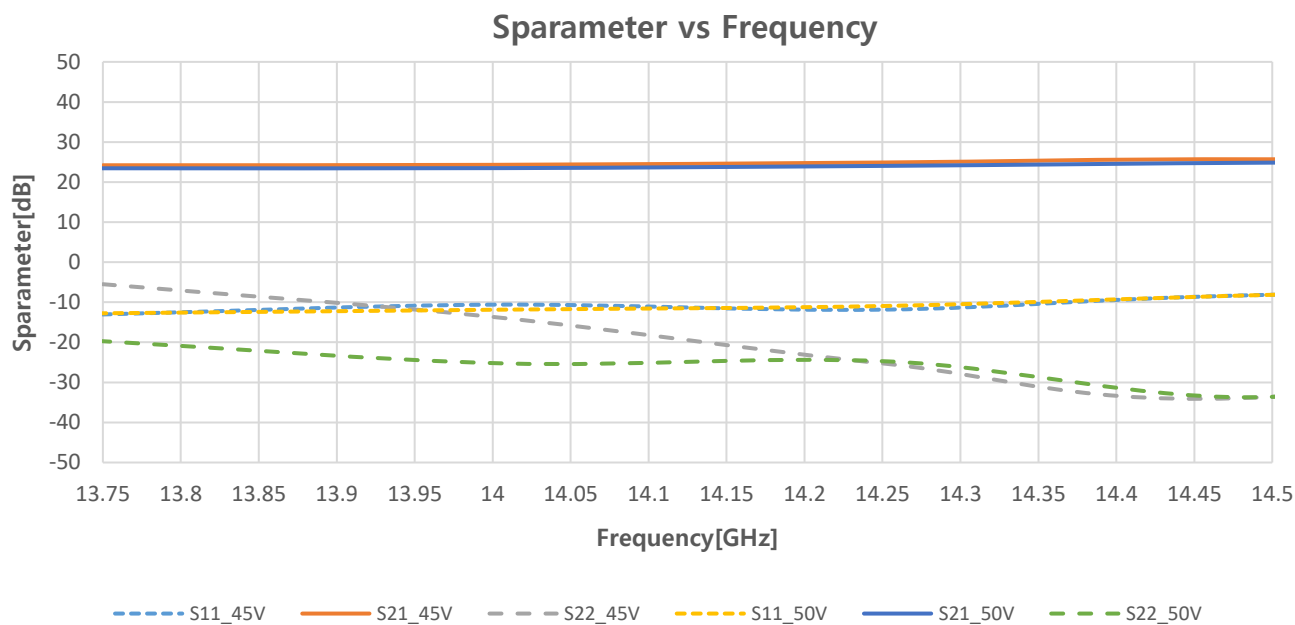
Specifications (T_A=25°C, F₀=14GHz, V_{DD}=50V, I_{DQ}=550mA)

Parameter	Symbol	MIN	TYP	MAX	Units	Conditions
Small Signal Gain	G		24.3		dB	Pulse Width=100μsec, Duty Cycle=10%
Power Gain	G _P		19.6		dB	P _{sat} @ I _{gs} =1mA
Saturated Output Power	P _{OUT}		50.2		dBm	P _{sat} @ I _{gs} =1mA
Power Added Efficiency	PAE		29.6		%	P _{sat} @ I _{gs} =1mA



Small-Signal Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

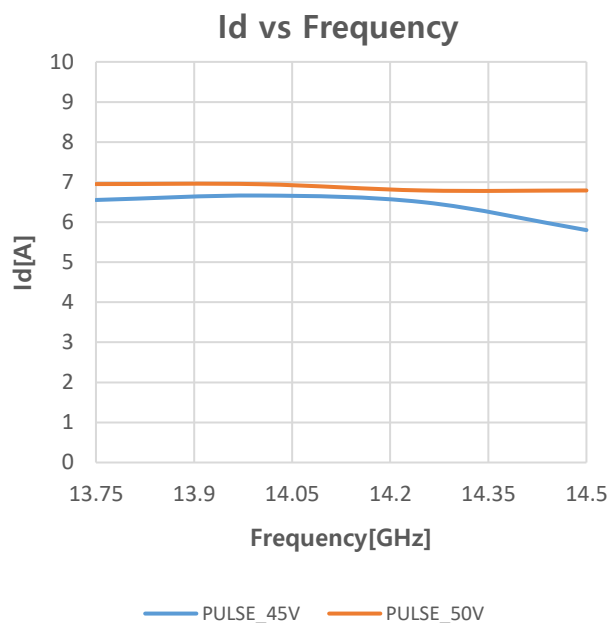
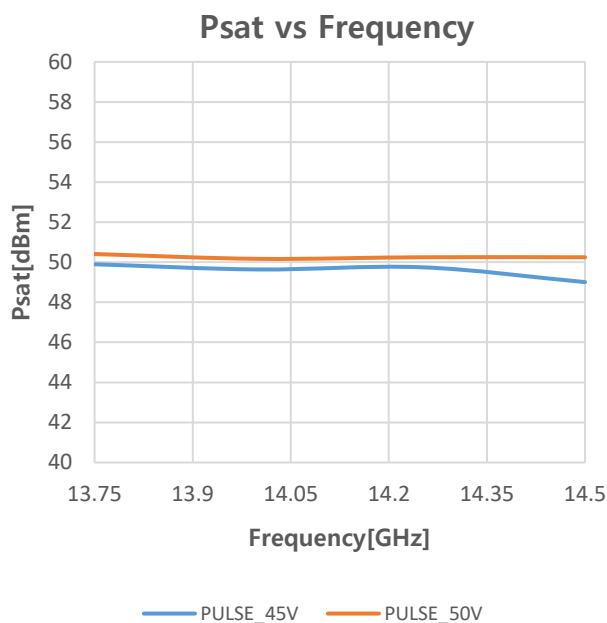




Psat, Id vs Frequency Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

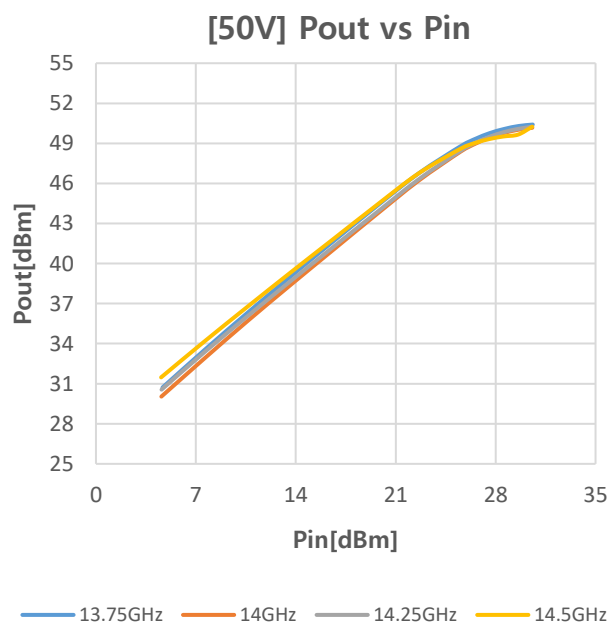
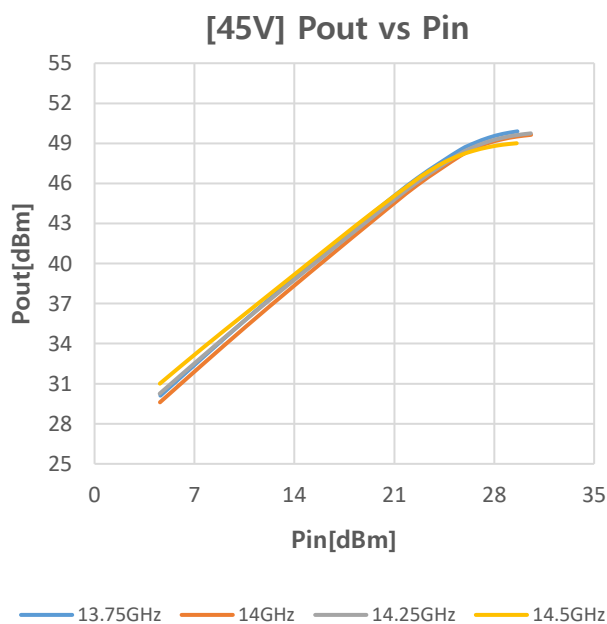
Pulse-Mode(Pulse Width=100μsec, Duty Cycle=10%)



Output Power (Pout) vs Input Power (Pin) Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

Pulse-Mode(Pulse Width=100μsec, Duty Cycle=10%)

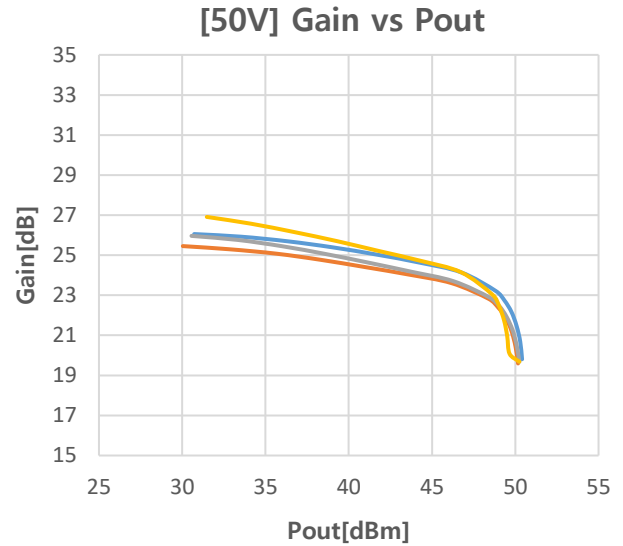
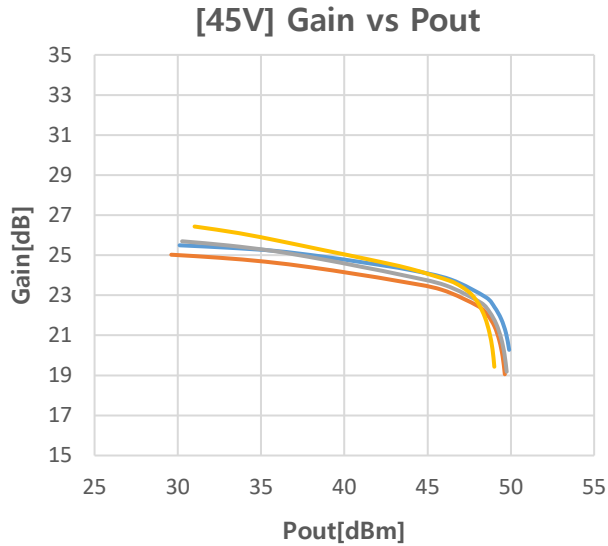




Gain vs Output Power (Pout) Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

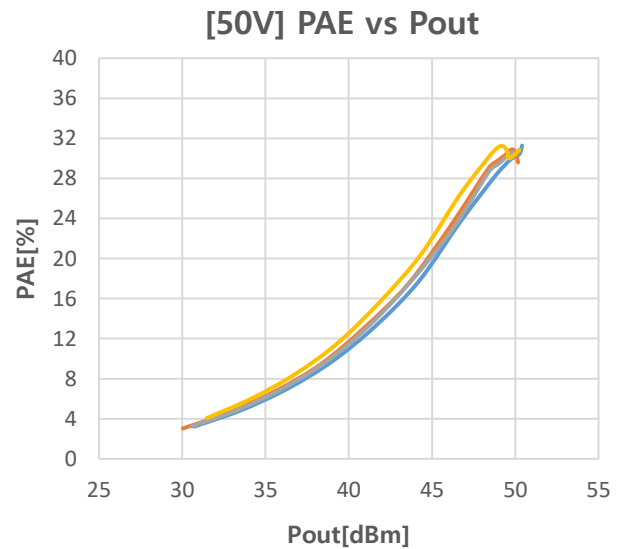
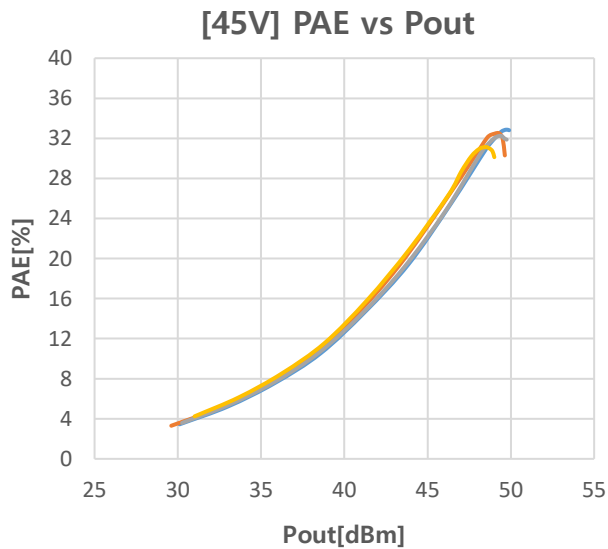
Pulse-Mode(Pulse Width=100μsec, Duty Cycle=10%)



PAE vs Output Power (Pout) Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

Pulse-Mode(Pulse Width=100μsec, Duty Cycle=10%)

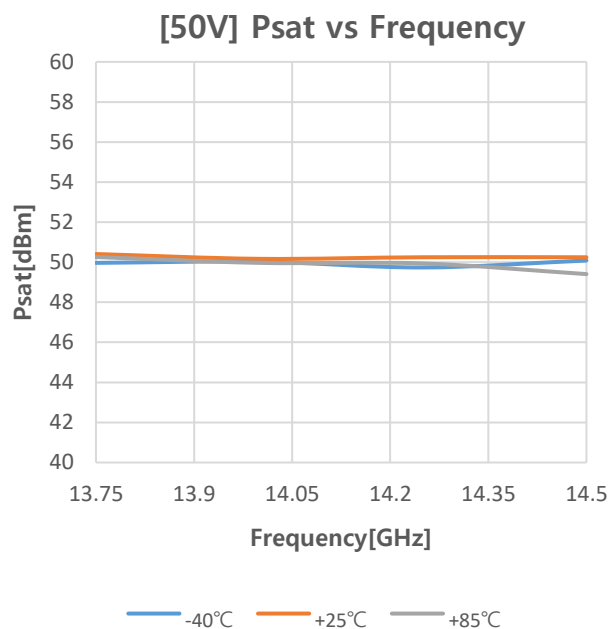
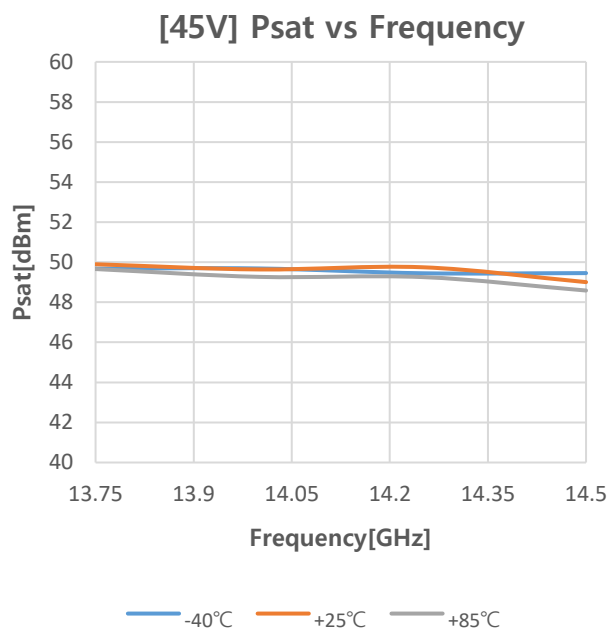




Psat vs Frequency Temperatures Performance

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

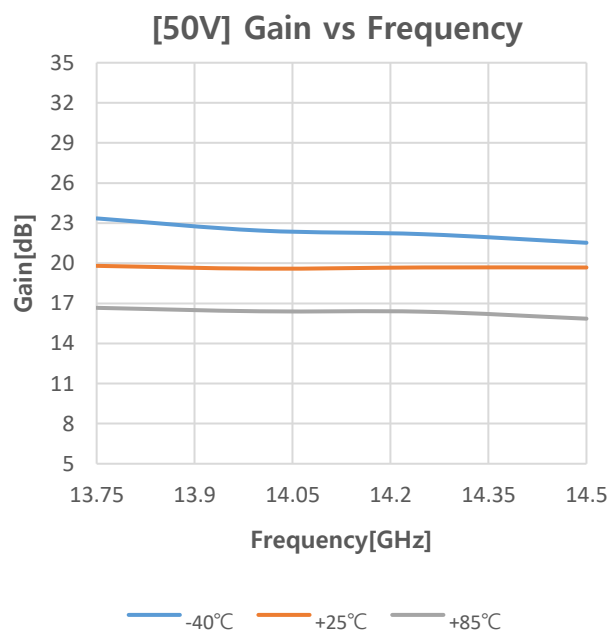
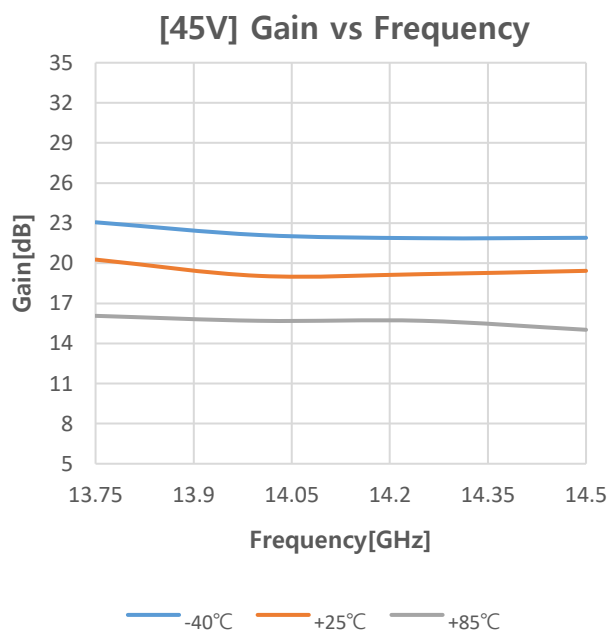
Pulse-Mode(Pulse Width=100μsec, Duty Cycle=10%)



Gain vs Frequency Temperatures Performance

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

Pulse-Mode(Pulse Width=100μsec, Duty Cycle=10%)

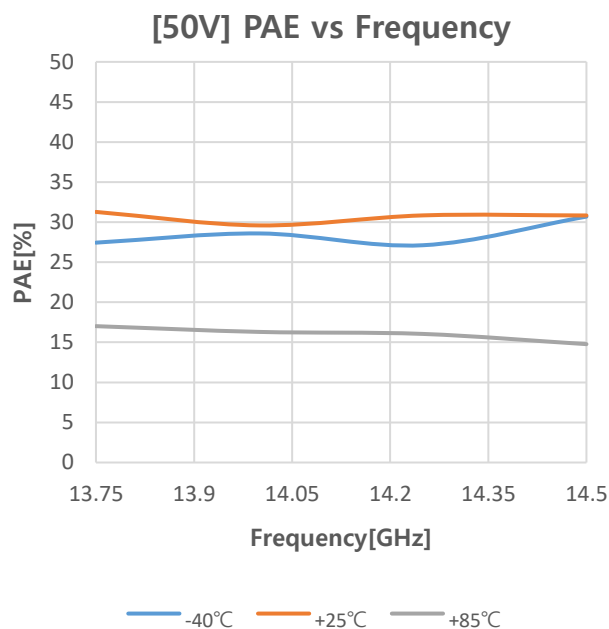
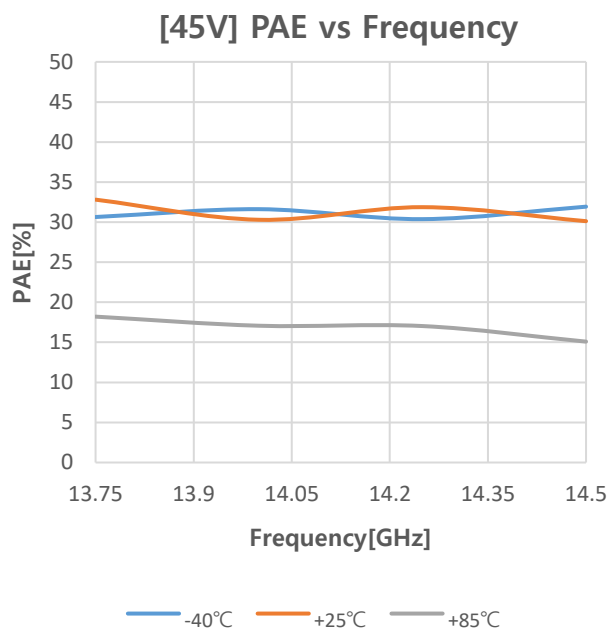




PAE vs Frequency Temperatures Performance

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

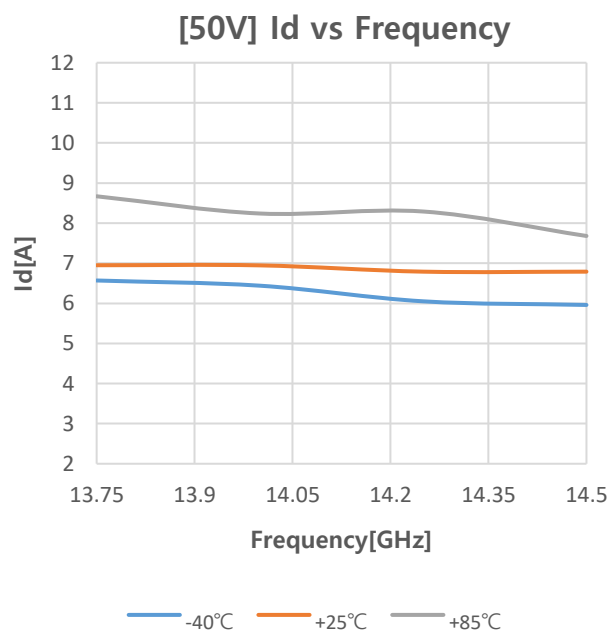
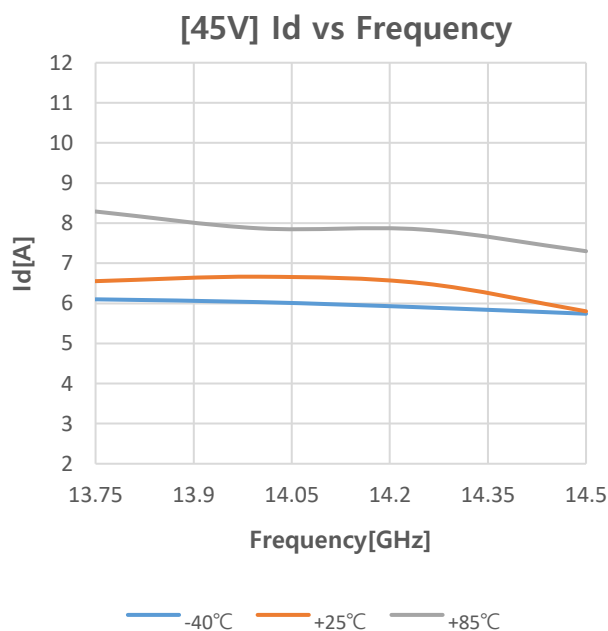
Pulse-Mode(Pulse Width=100μsec, Duty Cycle=10%)



Id vs Frequency Temperatures Performance

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

Pulse-Mode(Pulse Width=100μsec, Duty Cycle=10%)

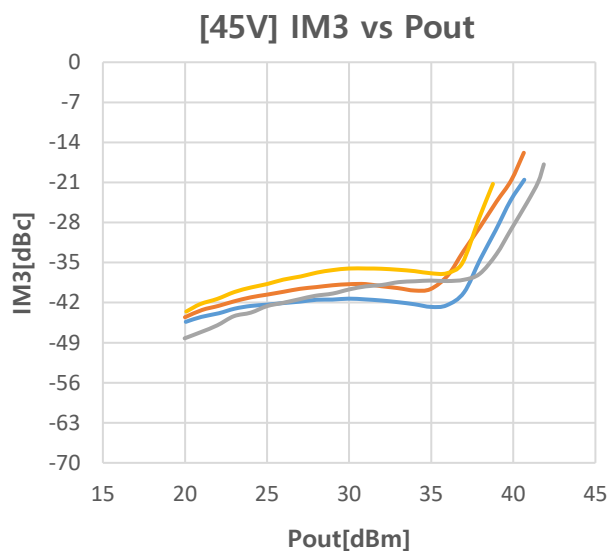




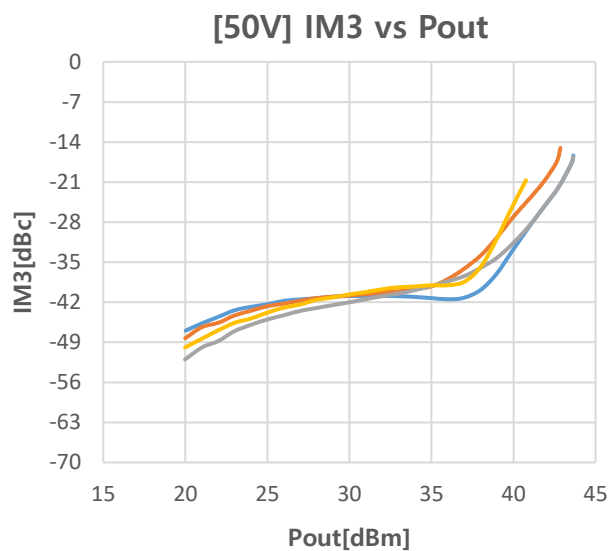
IM3 vs Output Power (Pout) Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

Tone Spacing = 10MHz



— 13.75GHz — 14GHz — 14.25GHz — 14.5GHz

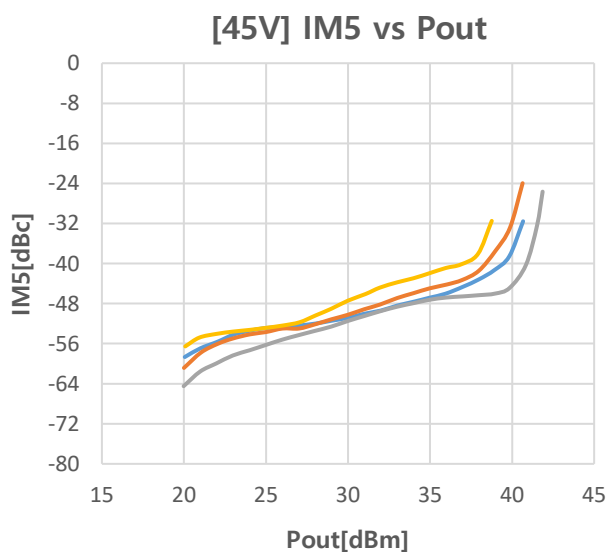


— 13.75GHz — 14GHz — 14.25GHz — 14.5GHz

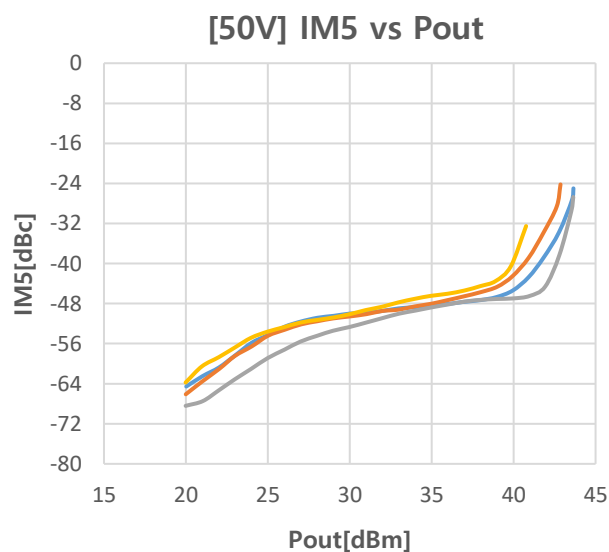
IM5 vs Output Power (Pout) Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

Tone Spacing = 10MHz



— 13.75GHz — 14GHz — 14.25GHz — 14.5GHz



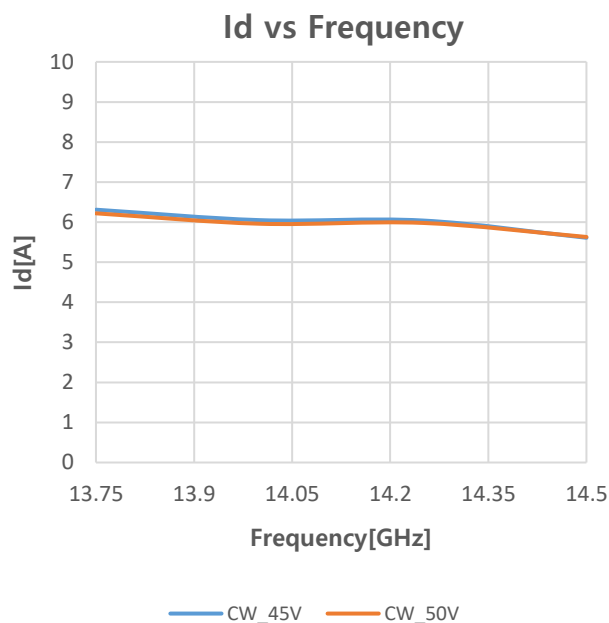
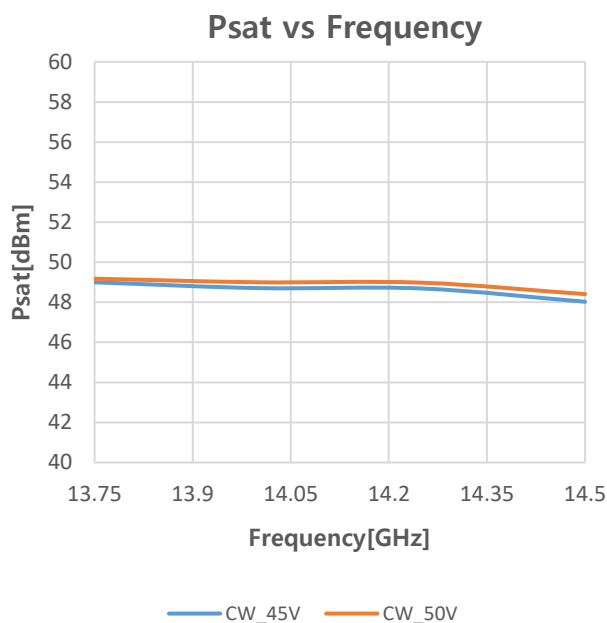
— 13.75GHz — 14GHz — 14.25GHz — 14.5GHz



Psat, Id vs Frequency Performance (TA=25°C)

Drain Voltage= 45V IDQ=460mA

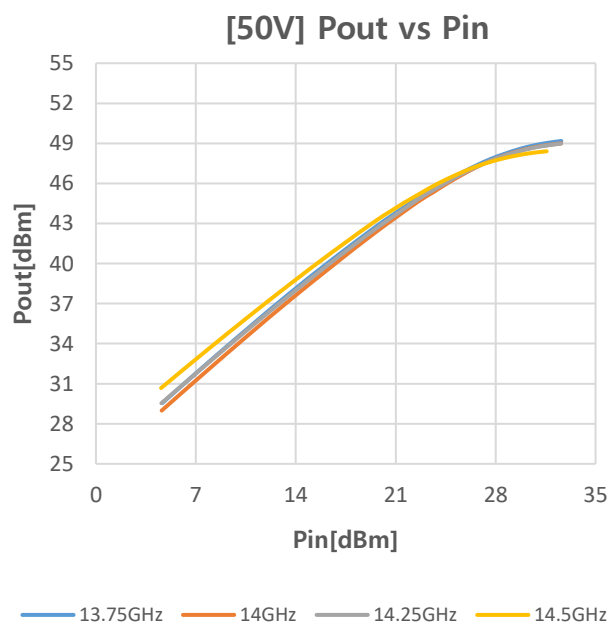
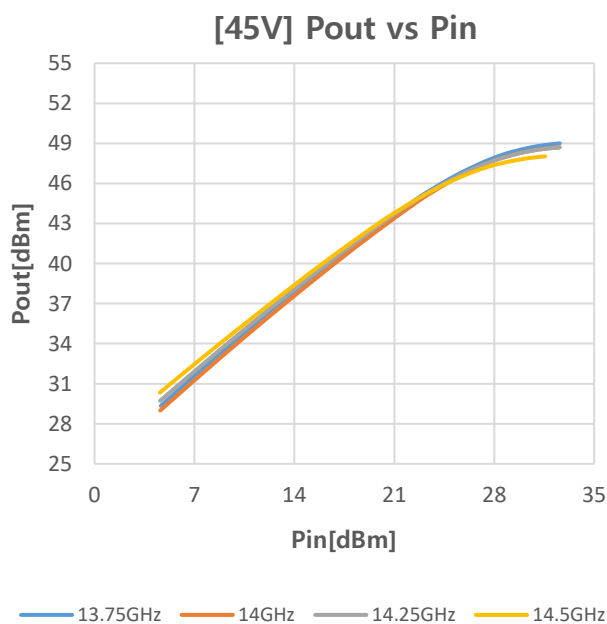
CW-Mode



Output Power (Pout) vs Input Power (Pin) Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

CW-Mode

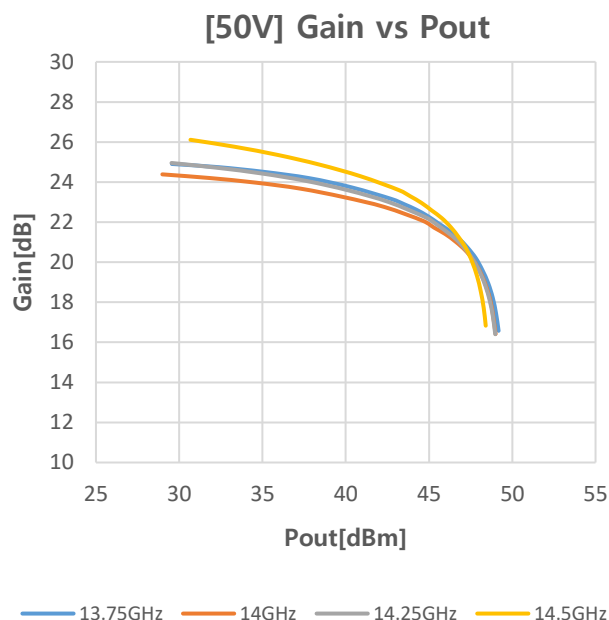
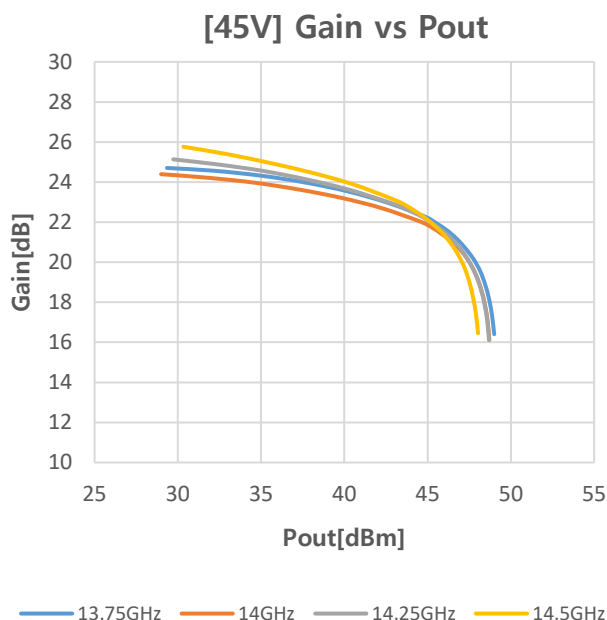




Gain vs Output Power (Pout) Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

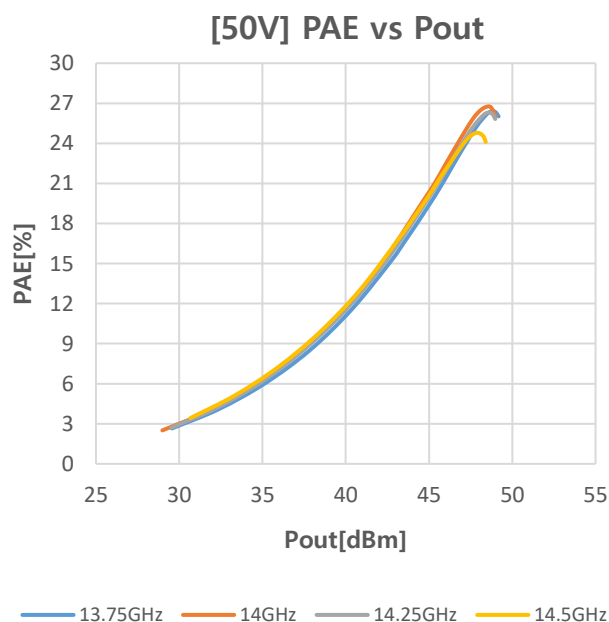
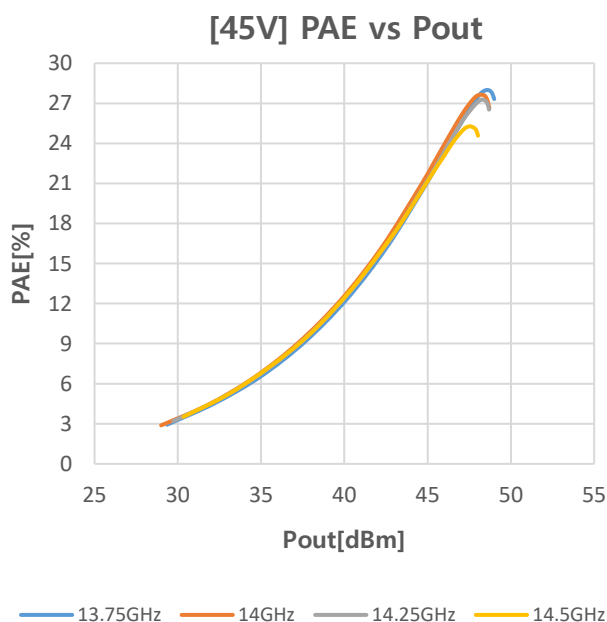
CW-Mode



PAE vs Output Power (Pout) Performance (TA=25°C)

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

CW-Mode

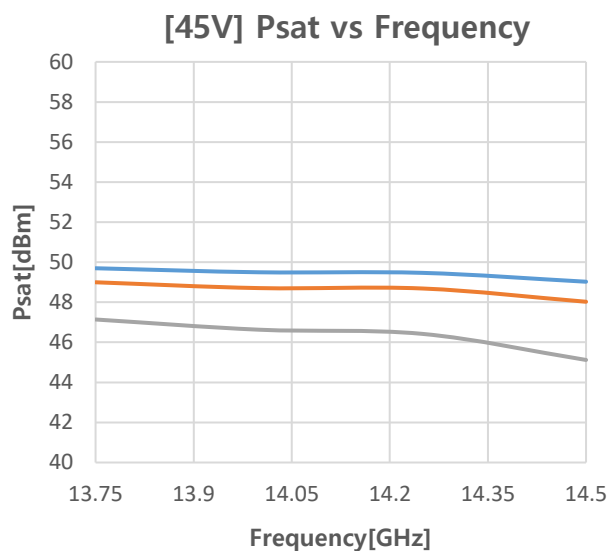




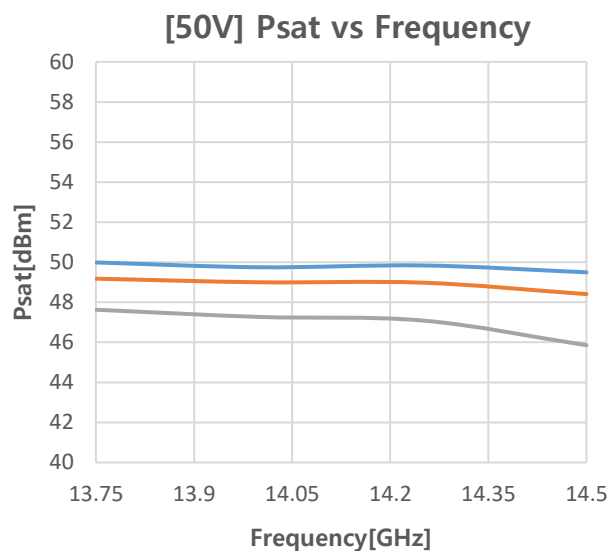
Psat vs Frequency Temperatures Performance

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

CW-Mode



— -40°C — +25°C — +85°C

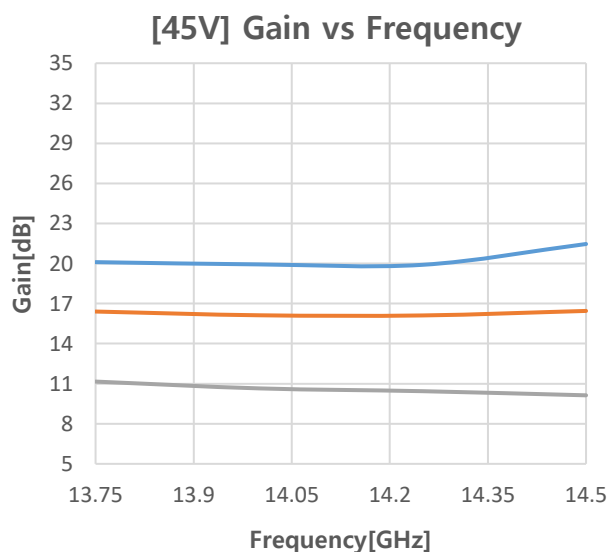


— -40°C — +25°C — +85°C

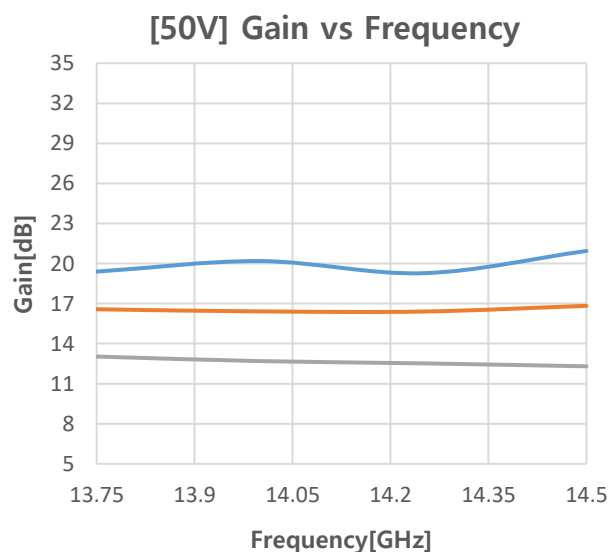
Gain vs Frequency Temperatures Performance

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

CW-Mode



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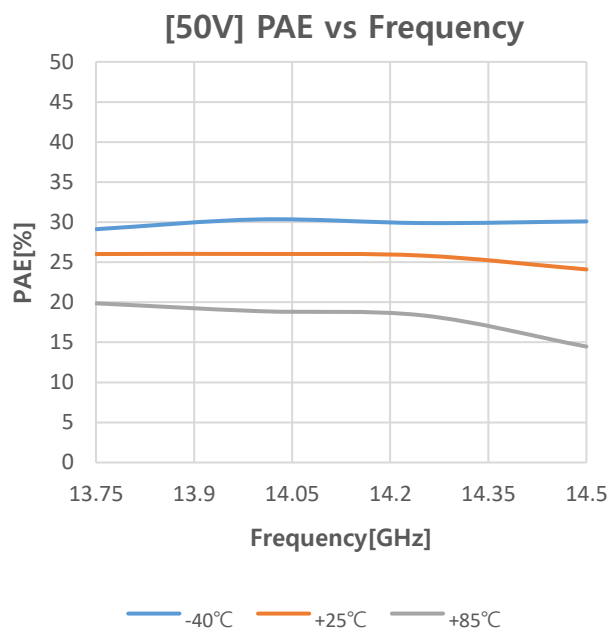
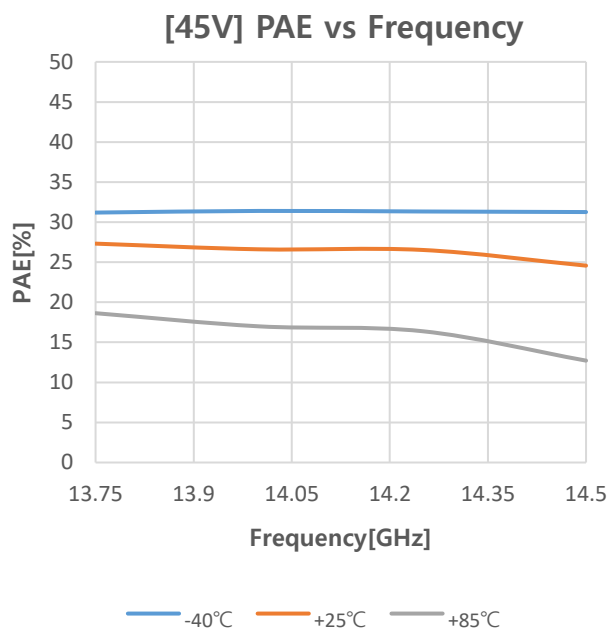
— -40°C — +25°C — +85°C



PAE vs Frequency Temperatures Performance

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

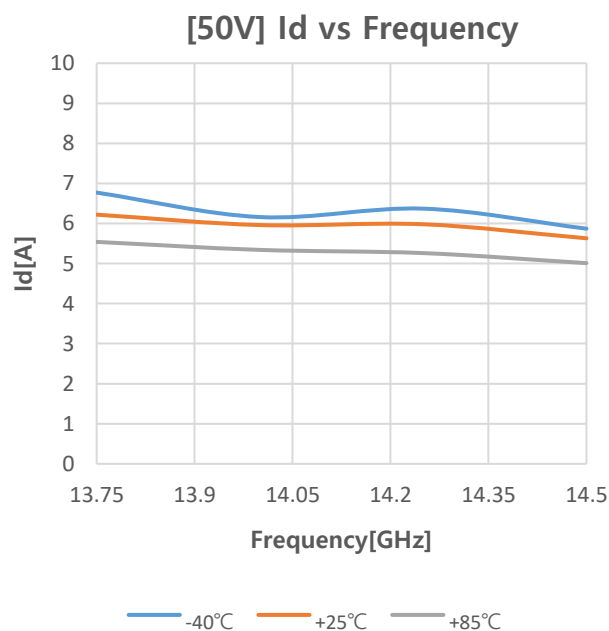
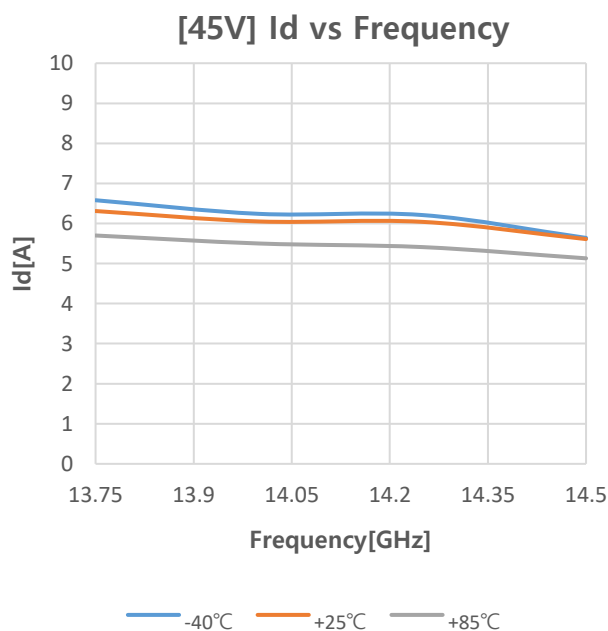
CW-Mode



Id vs Frequency Temperatures Performance

Drain Voltage= (45V IDQ=460mA), (50V IDQ=550mA)

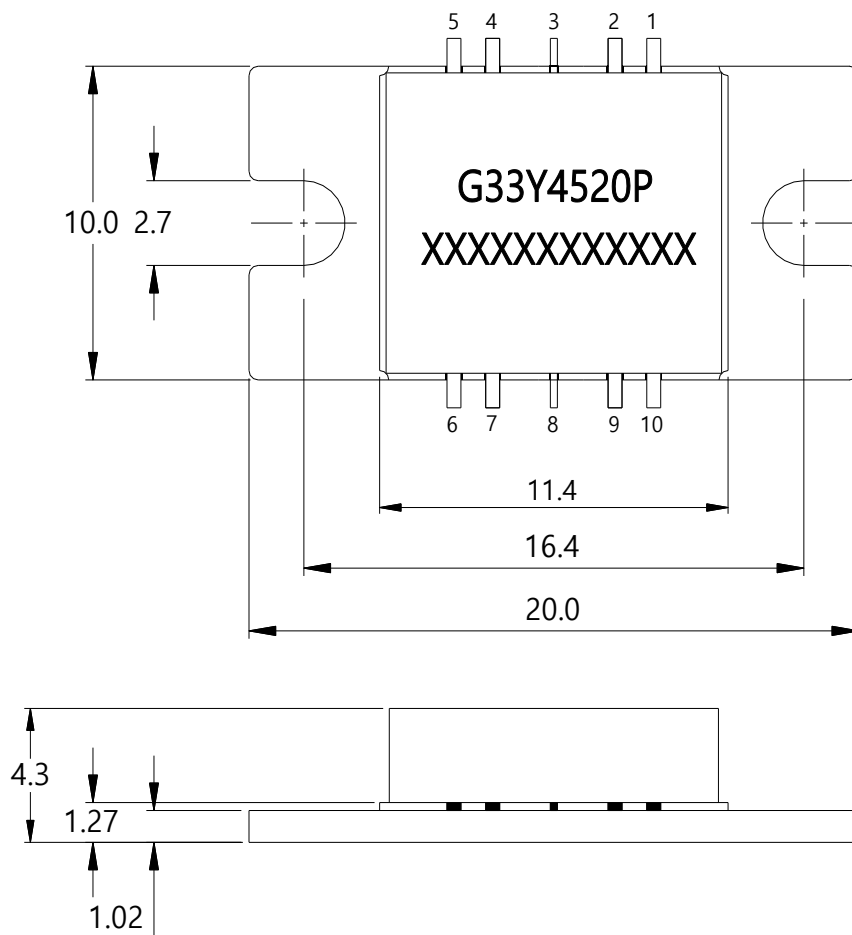
CW-Mode





Product Dimension

- Product Type: MPKG, 10-lead bolt-down
- Unit: mm



Pin No.	Function	Description
1, 5	VG	Gate Bias, bias must be applied to both pins
2, 4	No Connect	Pin can be open circuit
3	RF IN	50 ohm RF input, included DC Blocking Capacitors
6, 10	VD	Drain, Bias, bias must be applied to both pins
7, 9	No Connect	Pin can be open circuit
8	RF OUT	50 ohm RF output, included DC Blocking Capacitors
Flange	Ground	RF and DC Ground

Bias Sequence

1. Both sides must be connected to VG.
2. Both sides must be connected to VD.
3. VG bias must be applied before VD.

Bias On Sequence

1. Ensure RF is turned-off
2. Apply pinch-off voltage of -5V to the gate (Vg)
3. Apply nominal drain voltage (Vd)
4. Adjust Vg to obtain desired Idq
5. Apply RF

Bias Off Sequence

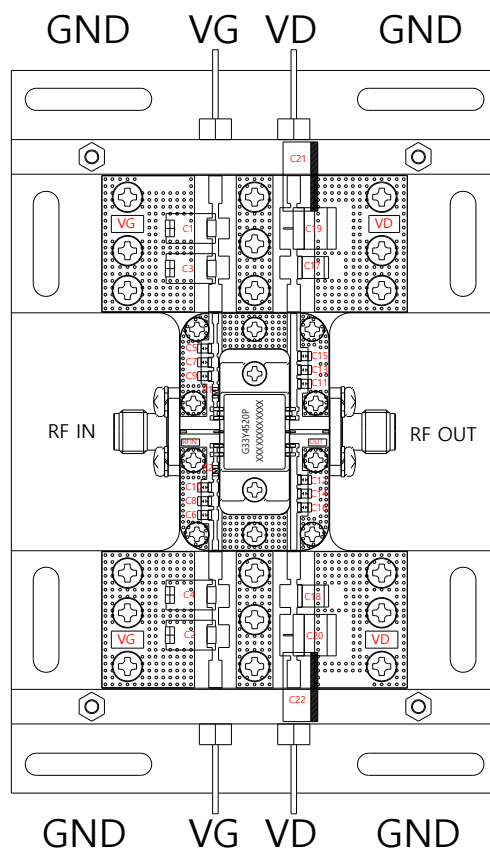
1. Turn RF off
2. Apply pinch-off voltage to the gate (Vg= -5V)
3. Turn off drain voltage (Vd)
4. Turn off gate voltage (Vg)

Test Condition

1. VD=45V, IDQ=460mA, VG=-2.49V
2. VD=50V, IDQ=550mA, VG=-2.5V



Evaluation Board



Evaluation Board Circuit Bill of Materials

No	Reference	Value	Description	Manufacturer	EA
1	C1, C2	47uF / 16VDC	Cap, 2917, 16V, 10%, Ta, -55~125°C, RoHS	Various	2
2	C3, C4	10uF / 35VDC	Cap, 2917, 25V, ±10%, Ta, SMD	Various	2
3	C9, C10, C11, C12	100pF	Cap ,MLCC, SMD/ SMT	Various	4
4	C7, C8, C13, C14	10nF	Cap, MLCC ,0805 ,100V ,±10%, X7R, SMD/SMT	Various	4
5	C5, C6, C15, C16	470nF	Cap, MLCC, 0805, 100V, 10%, X7S, SMD/SMT	Various	4
6	C17, C18	470nF	Cap, 1812, 100V, 10%, X7R	Various	2
7	C19, C20	10uF	Cap, 2220, 100V, ±10%, SMD	Various	2
8	R1, R2	10 Ohm	Chip Resistor	Various	2
9	C21, C22	47uF / 100V	electrolytic capacitor	Various	2
10	-	DC To 26.5 GHz	SMA 4 Hole	Various	2
11	-	100pF	Feed through Capacitor	Various	4
12	-	-	Terminals / Turret Connectors	Various	4



Handling Precautions

Parameter	Classification	Standard
ESD - Human Body Model (HBM)	Class 1A	ANSI/ESDA/JEDEC JS-001-2017
ESD - Charge Device Model (CDM)	Class C2	ANSI/ESDA/JEDEC JS-002-2018
MSL - Moisture Sensitivity Level	N/A	



ATTENTION
Electrostatic
Sensitive Device

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

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Tel : 82 - (0)31 - 8058 - 3374
Email : sales@wavepia.com

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