

3V TRI-BAND GSM POWER AMPLIFIER MODULE**Features**

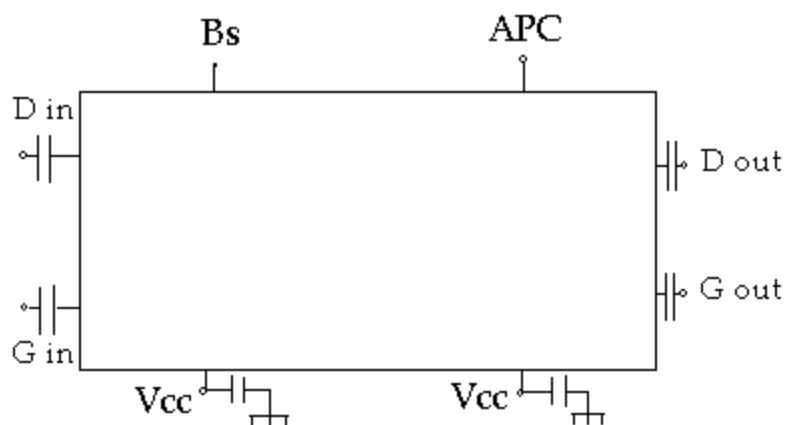
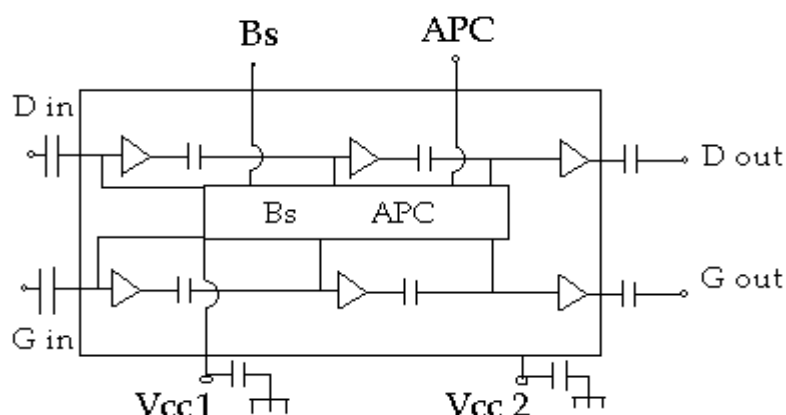
- 3.5V Single Supply Operation
- 50 Ohms internally matched for input and output
- High Efficiency EGSM=52%, DCS= 47%
- 8-pin, 6 X 6mm LGA, surface mounted module
- On Board band select and output power control
- GPRS capable (Class 8, 10 and 12, 4 TX slots max.)

Applications

- Class 4 EGSM900 and
- Class 1 DCS1800 Cellular Handsets
- EGSM900 / DCS1800 / PCS1900
- GPRS Class 8, 10 and 12

Description

The ECM009 is a tri-band EGSM/GPRS power amplifier module which is built on EiC's proprietary InGaP Heterojunction Bipolar Transistor (HBT) PA MMICs. The fully integrated PAM incorporates a band select switch and analog power control, and is input and output matched to 50 Ohm.

Application Diagram**Functional Block Diagram**

CAUTION!
SENSITIVE ELECTRONIC DEVICE

ELECTRICAL SPECIFICATIONS

The following tables list the electrical characteristics of the ECM009 Power Amplifier Module.

Table 1 lists the electrical performance of the ECM009 for nominal operating conditions for the cellular GSM (880-915MHz) band.

Table 2 lists the electrical performance of the ECM009 for nominal operating conditions for the DCS (1710-1785MHz) band.

Table 3 lists the electrical performance of the ECM009 for nominal operation conditions for the PCS (1850-1910MHz) band.

Table 1 - Electrical specifications (1 of 3)

Test Conditions: Ta = 25°C, V_{cc} = +3.5 V, Pulse Width 1154 us, Duty Cycle 25%, 50 Ohm System
GSM Modulation, time slot 0, 1 ON, 2-7 OFF

SYMBOL	PARAMETER	LIMITS			UNIT	TEST CONDITION
		MIN.	TYP.	MAX.		
F	Frequency - GSM 900	880		915	MHz	
Pin	Input Power - GSM 900		7		dBm	
Pout	Output Power - GSM 900		35.0		dBm	Note 1
PAE	Power Added Efficiency - GSM 900		52		%	Note 1
IRL	Input Return Loss (50 Ohm)		15		dB	
	Output Load Impedance		50		ohms	
	Forward Isolation		-34		dBm	Note 3
Pnoise	Output Noise Power (935 - 960MHz)		-83		dBm	Note 4
	Harmonics (2fo to 7fo)			-25	dBc	
	Leakage Current		10		uA	Note 2
Vapc	Control Voltage	0.2		2.8	V	
Iapc	Power Control Current		4		mA	
	Power Control Range		70		dB	Vapc = .2 to 2.6V
	Ruggedness Class 12	5:1				Pin=min to max all phases
	Rise fall time Po= -10 to 35dBm		11		μs	
	Rise fall time Po= -10 to +15dBm		2		μs	
	Rise fall time Po= -10 to 0dBm		1		μs	
	Band Select					
Vbs	GSM 900	0.0		0.5	V	
Vbs	DCS 1800/PCS 1900	2.0			V	
Vcc	Supply Voltage	2.9	3.5		V	
Note 1: Vcc = 3.5V, Vapc = 2.5V						
Note 2: Vcc = 4.5V, Vapc = 0V, Vbs = 0V						
Note 3: Vapcgsms=.2V, Pin=+10dBm						
Note 4: RBW=100KHz 935MHz to 960MHz Pout=35dBm Vcc=3.5V Pin=+7dBm						

ELECTRICAL SPECIFICATIONS

Table 2 lists the electrical performance of the ECM009 for nominal operating conditions for the DCS 1800MHz band.

Table 2 - Electrical specifications (2 of 3)

Test Conditions: Ta = 25°C, V_{cc} = +3.5 V, Pulse Width 1154 us, Duty Cycle 25%, 50 Ohm System
GSM Modulation, time slot 0, 1 ON, 2-7 OFF

SYMBOL	PARAMETER	LIMITS			UNIT	TEST CONDITION
		MIN.	TYP.	MAX.		
F	Frequency - DCS 1800	1710		1785	MHz	
Pin	Input Power - DCS 1800		7		dBm	
Pout	Output Power - DCS 1800		32.0		dBm	Note 1
PAE	Power Added Efficiency - DCS 1800		47		%	Note 1
IRL	Input Return Loss (50 Ohm)		10		dB	
	Output Load Impedance		50		ohms	
	Forward Isolation		-34		dBm	Note 3
Proise	Output Noise Power		-80		dBm	Note 4
	Harmonics (2fo to 7fo)			-45	dBc	
	Leakage Current		10		uA	Note 2
Vapc	Control Voltage	0.2		2.8	V	
Iapc	Power Control Current		4		mA	
	Power Control Range		70		dB	Vapc = .2 to 2.6V
	Ruggedness Class 12	8:1				Pin=min to max all phases
	Rise fall time Po= -10 to +32dBm		14		μs	
	Rise fall time Po= -10 to +15dBm		3		μs	
	Rise fall time Po= -10 to 0dBm		1		μs	
	Band Select					
Vbs	GSM 900	0.0		0.5	V	
Vbs	DCS 1800/ PCS 1900	2.0			V	
Vcc	Supply Voltage	2.9	3.5		V	
Note 1: Vcc = 3.5V, Vapc = 2.5V						
Note 2: Vcc = 4.5V, Vapc = 0V, Vbs = 0V						
Note 3: Vapc=.2V, Pin=+10dBm						
Note 4: RBW=100KHz 1805MHz to 1880MHz Pout=32dBm Vcc=3.5V Pin=+7dBm						

ELECTRICAL SPECIFICATIONS

Table 3 lists the electrical performance of the ECM009 for nominal operating conditions for the PCS 1900MHz band.

Table 3 Electrical specifications (3 of 3)

Test Conditions: Ta = 25°C, V_{cc} = +3.5 V, Pulse Width 1154 us, Duty Cycle 25%, 50 Ohm System
GSM Modulation, time slot 0, 1 ON, 2-7 OFF

SYMBOL	PARAMETER	LIMITS			UNIT	TEST CONDITION
		MIN.	TYP.	MAX.		
F	Frequency - PCS -1900	1850		1910	MHz	
Pin	Input Power - PCS 1900		7		dBm	
Pout	Output Power - PCS 1900		31.5		dBm	Note 1
PAE	Power Added Efficiency - PCS 1900		47		%	Note 1
IRL	Input Return Loss (50 Ohm)		10		dB	
	Output Load Impedance		50		ohms	
	Forward Isolation		-34		dBm	Note 3
Proise	Output Noise Power		-81		dBm	Note 4
	Harmonics (2fo to 7fo)			-45	dBc	
	Leakage Current		10		uA	Note 2
Vapc	Control Voltage	0.2		2.8	V	
Iapc	Power Control Current		4		mA	
	Power Control Range		70		dB	Vapc = .2 to 2.6V
	Ruggedness Class 12	8:1				Pin=min to max all phases
	Rise fall time Po= -10 to +31.5dBm		11		μs	
	Rise fall time Po= -10 to +15dBm		3		μs	
	Rise fall time Po= -10 to 0dBm		1		μs	
	Band Select					
Vbs	GSM 900	0.0		0.5	V	
Vbs	DCS 1800/PCS 1900	2.0			V	
Vcc	Supply Voltage	2.9	3.5		V	
Note 1: Vcc = 3.5V, Vapc = 2.5V						
Note 2: Vcc = 4.5V, Vapc = 0V, Vbs = 0V						
Note 3: Vapc=.2V, Pin=+10dBm						
Note 4: RBW=100KHz 1930MHz to 1990MHz Pout=31.5dBm Vcc=3.5V Pin=+7dBm						

PIN ASSIGNMENTS

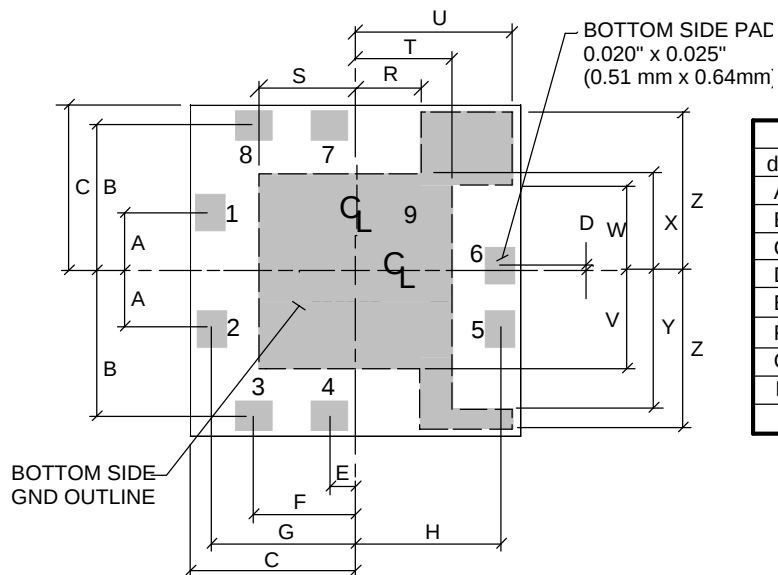
PIN	FUNCTION	DESCRIPTION
1	DCS IN	RF input port to DCS PA (Requires dc block)
2	EGSM IN	RF input port to EGSM PA (Requires dc block)
3	Vcc	Vcc Power supply for PA
4	Vcc	Vcc Power supply for PA
5	GSM OUT	RF output port for PA (Requires dc block)
6	DCS OUT	RF output port for PA (Requires dc block)
7	Vapc	Analog power control
8	BS	Band select
Center pad		RF ground and heat sink.
Notes:		All supply pins may be connected together at the supply.

PACKAGE MARKINGS AND DIMENSIONS

The ECM009 is a laminate based, overmold encapsulated modular package designed for surface-mounted solder attachment to a printed circuit board.

Package Dimensions

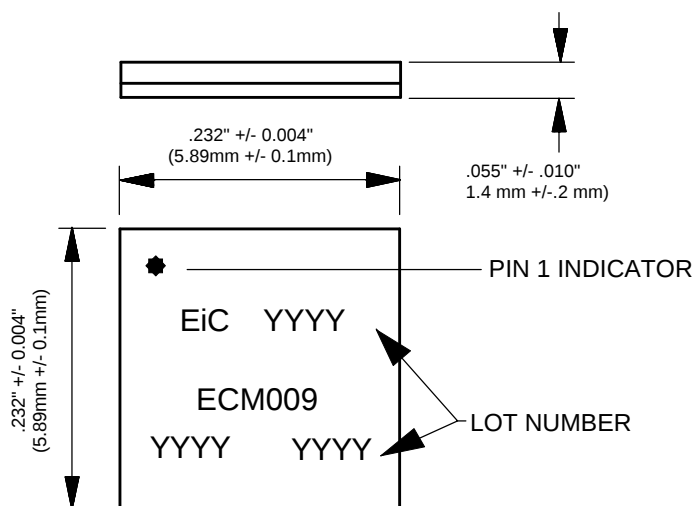
TOP VIEW



PACKAGE DIMENSIONS					
dim	inches	mm	dim	inches	mm
A	.041	1.04	R	.046	1.17
B	.103	2.62	S	.069	1.75
C	.118	3.00	T	.069	1.75
D	.003	0.07	U	.112	2.84
E	.019	0.48	V	.070	1.78
F	.073	1.85	W	.062	1.57
G	.103	2.62	X	.069	1.75
H	.103	2.62	Y	.098	2.49
			Z	.113	2.87

PINOUT	
PIN 1	DCSin
PIN 2	GSMIn
PIN 3	Vcc
PIN 4	Vcc
PIN 5	GSMout
PIN 6	DCSout
PIN 7	Vapc
PIN 8	Vbs
PIN 9	Gnd

Device Marking



TOP VIEW WITH MARKING DIAGRAM

Figure 1

GSM Band Pout & Icc vs. VAPC @ 25C

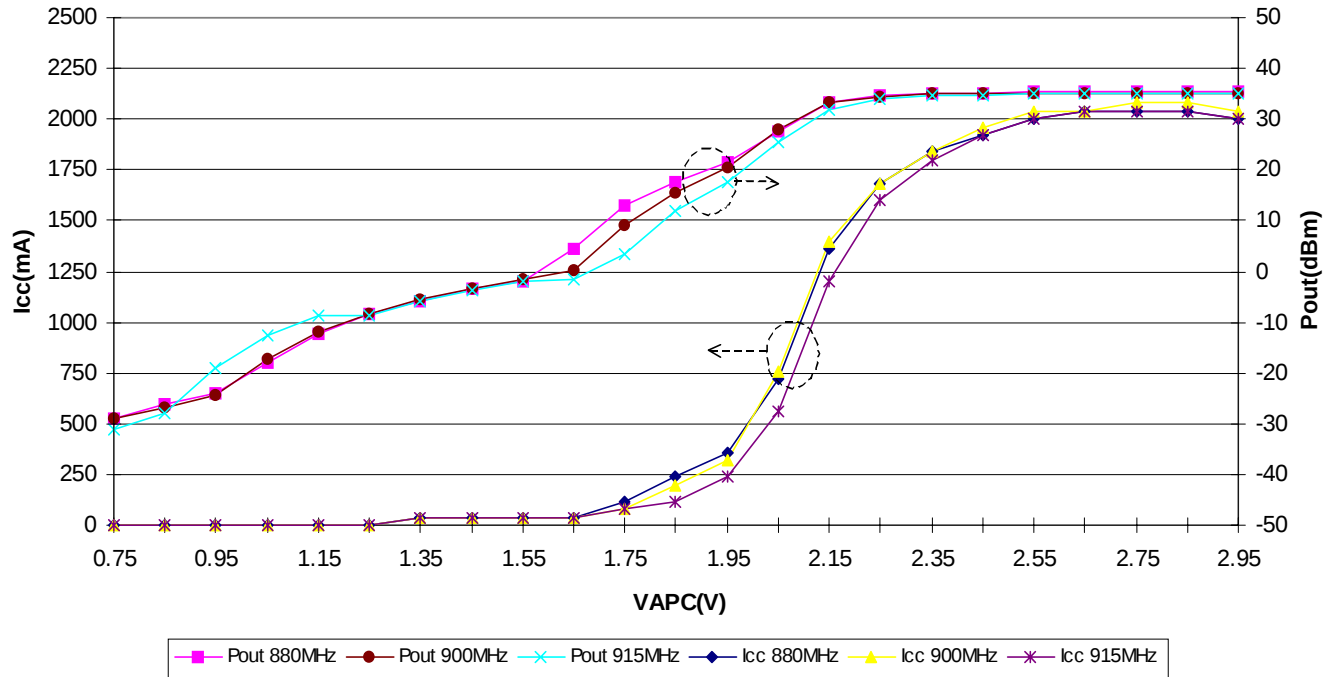


Figure 2

GSM Band Pout & Icc vs. VAPC @ -40C

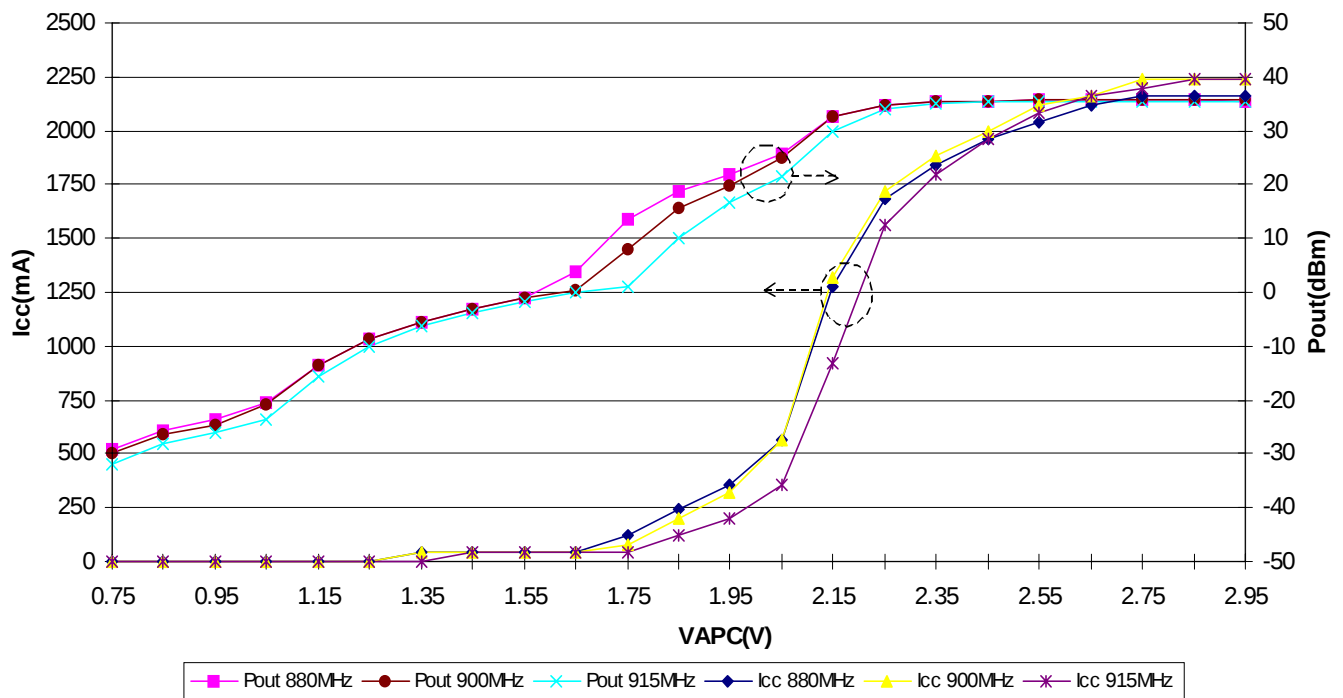


Figure 3

GSM Band Pout & Icc vs. VAPC @ +85C

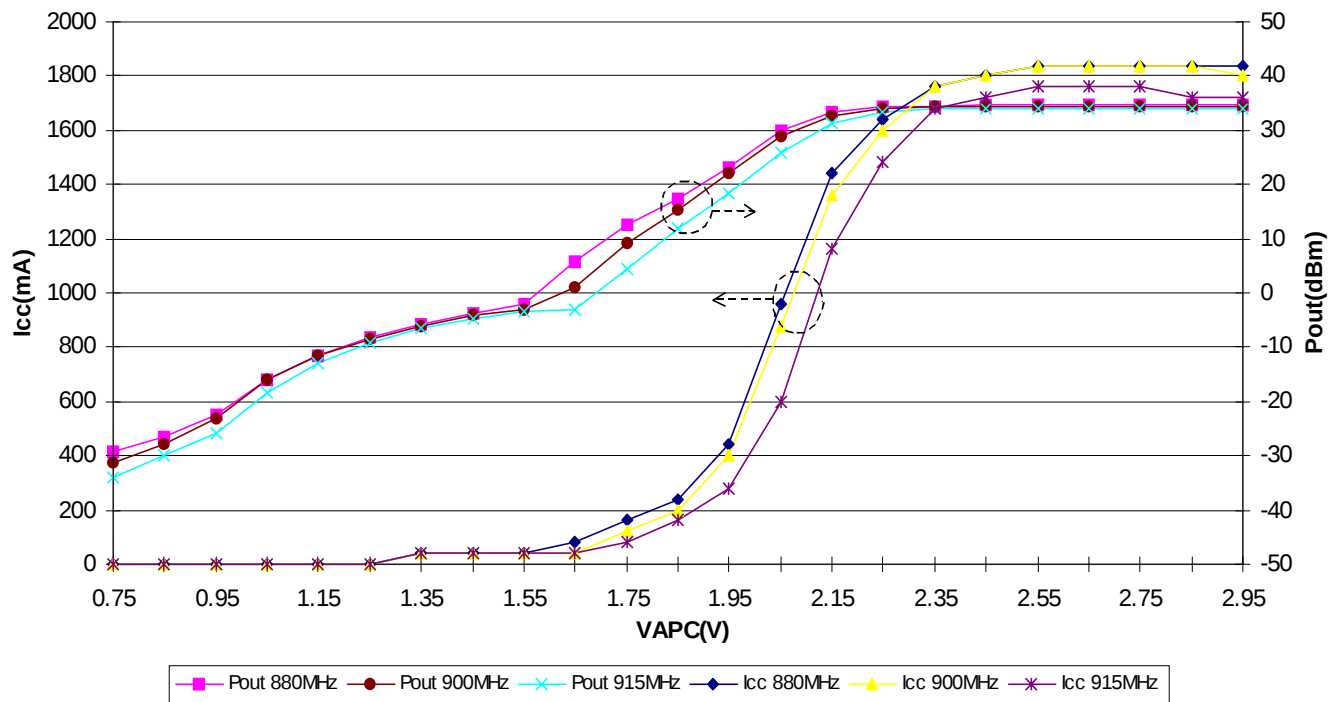


Figure 4

GSM Band Icc & Eff vs. Pout

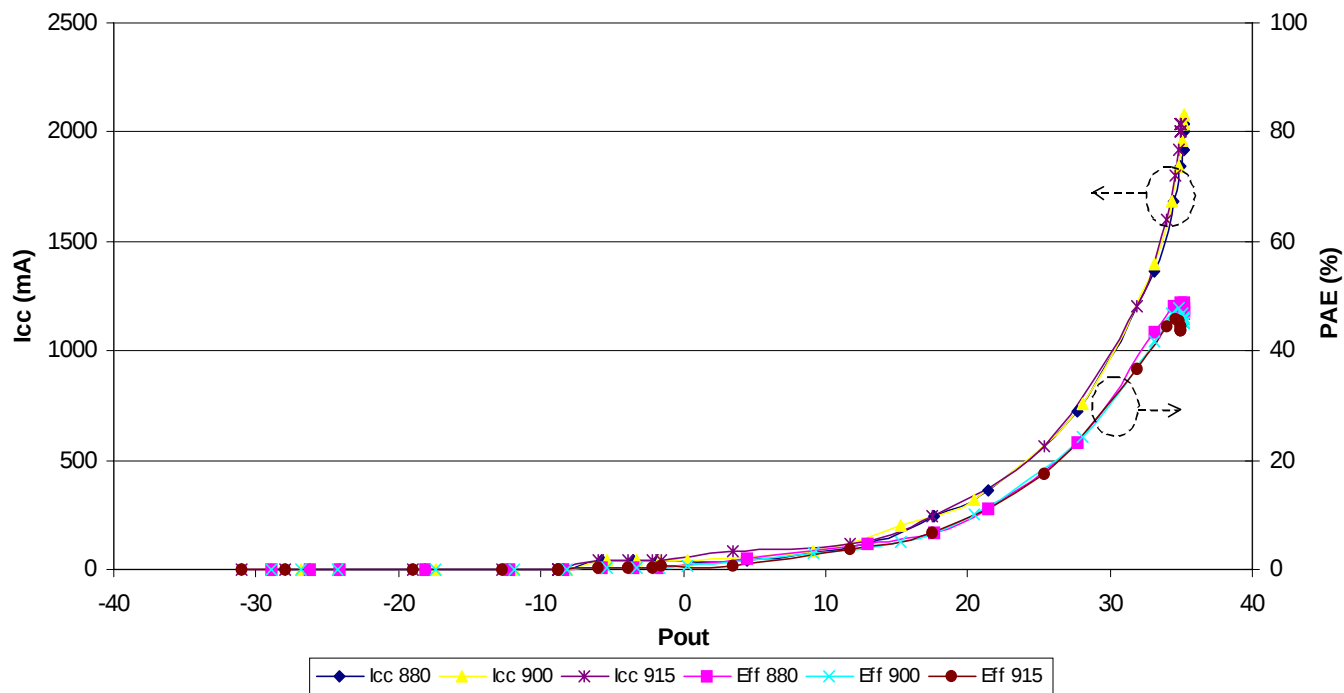


Figure 5

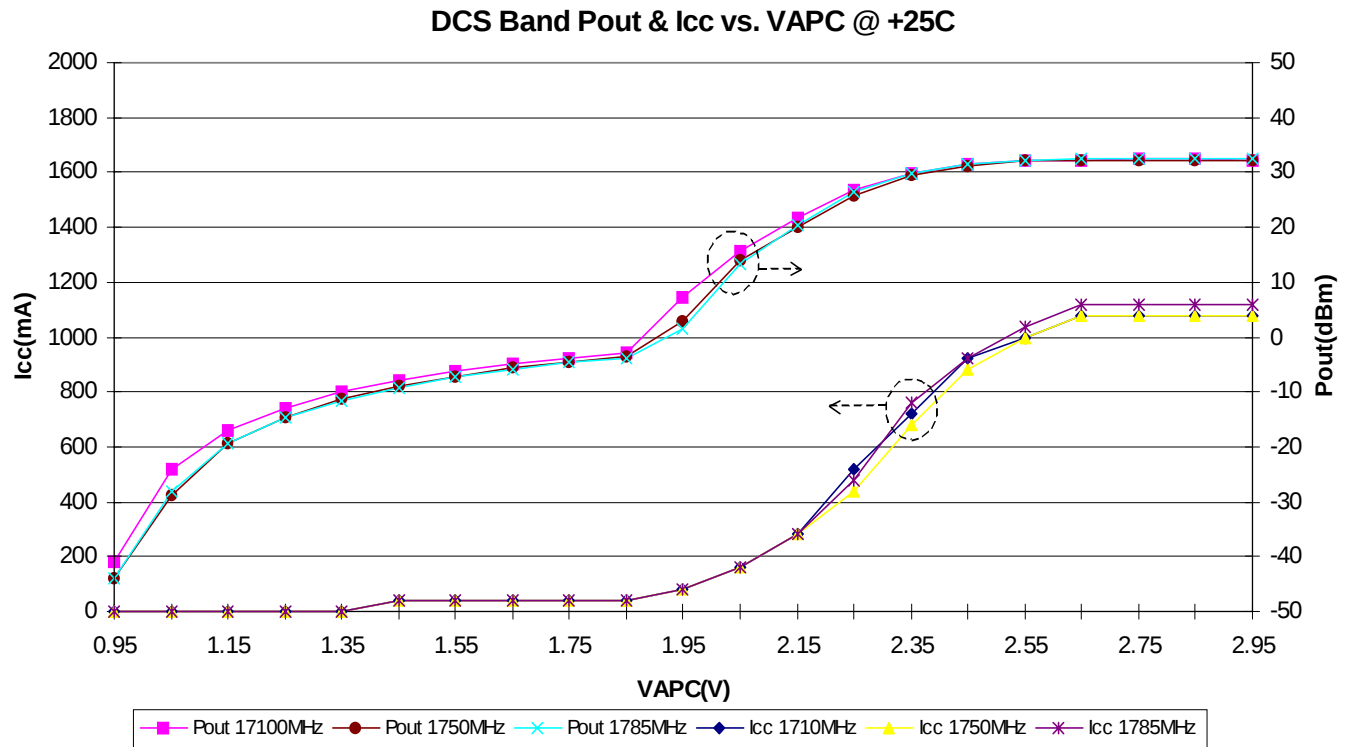


Figure 6

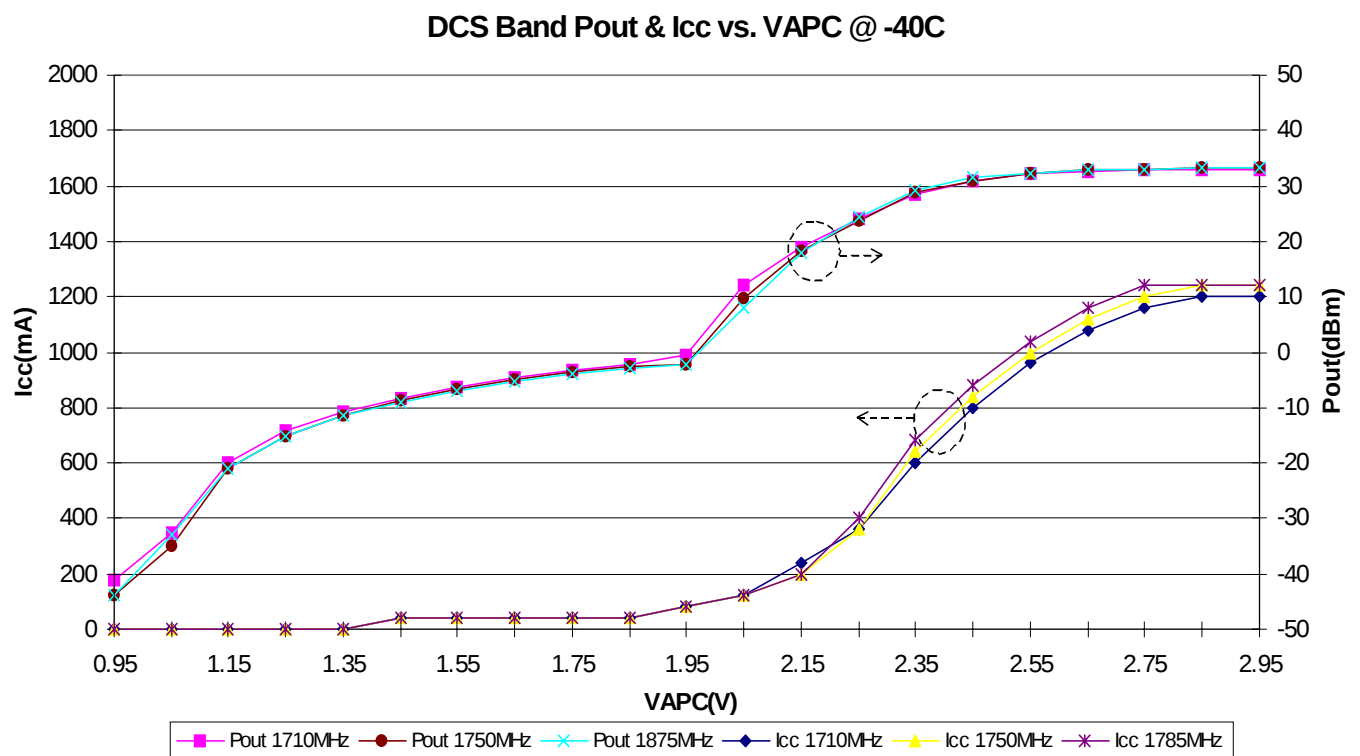


Figure 7

DCS Band Pout & Icc vs. VAPC @ +85C

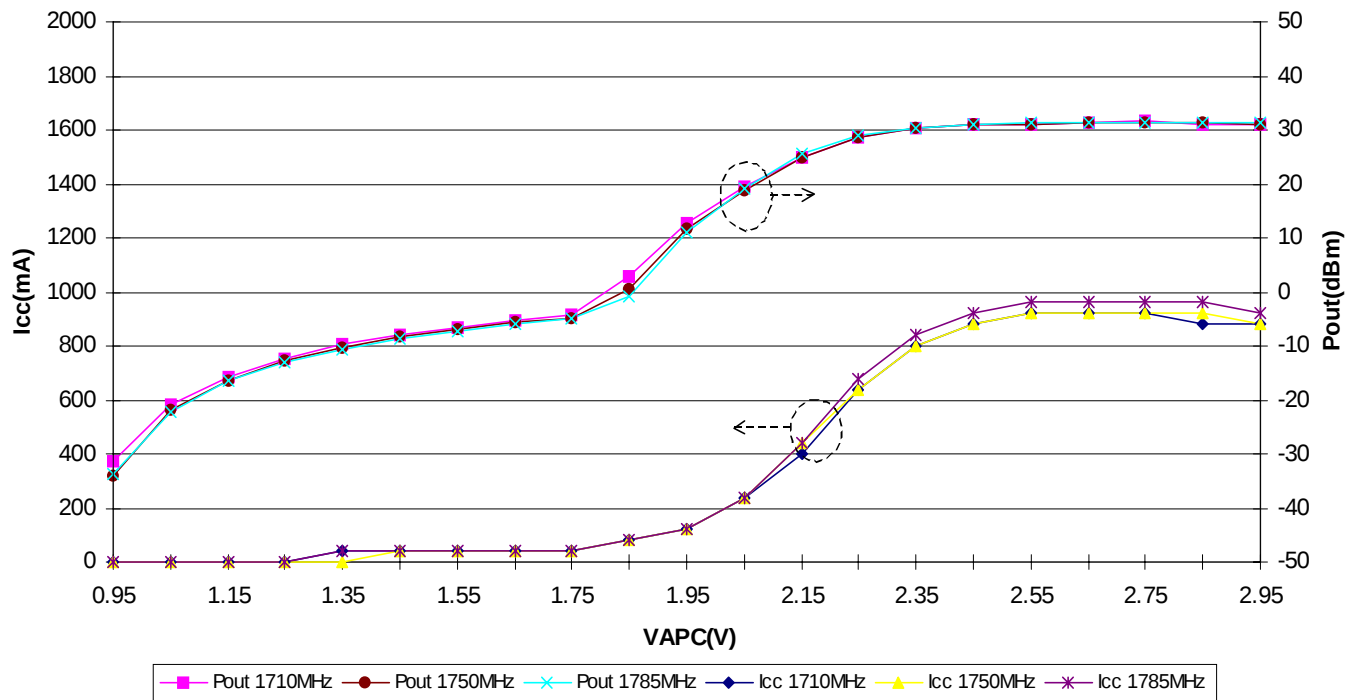


Figure 8

DCS Band Icc & Eff vs Pout

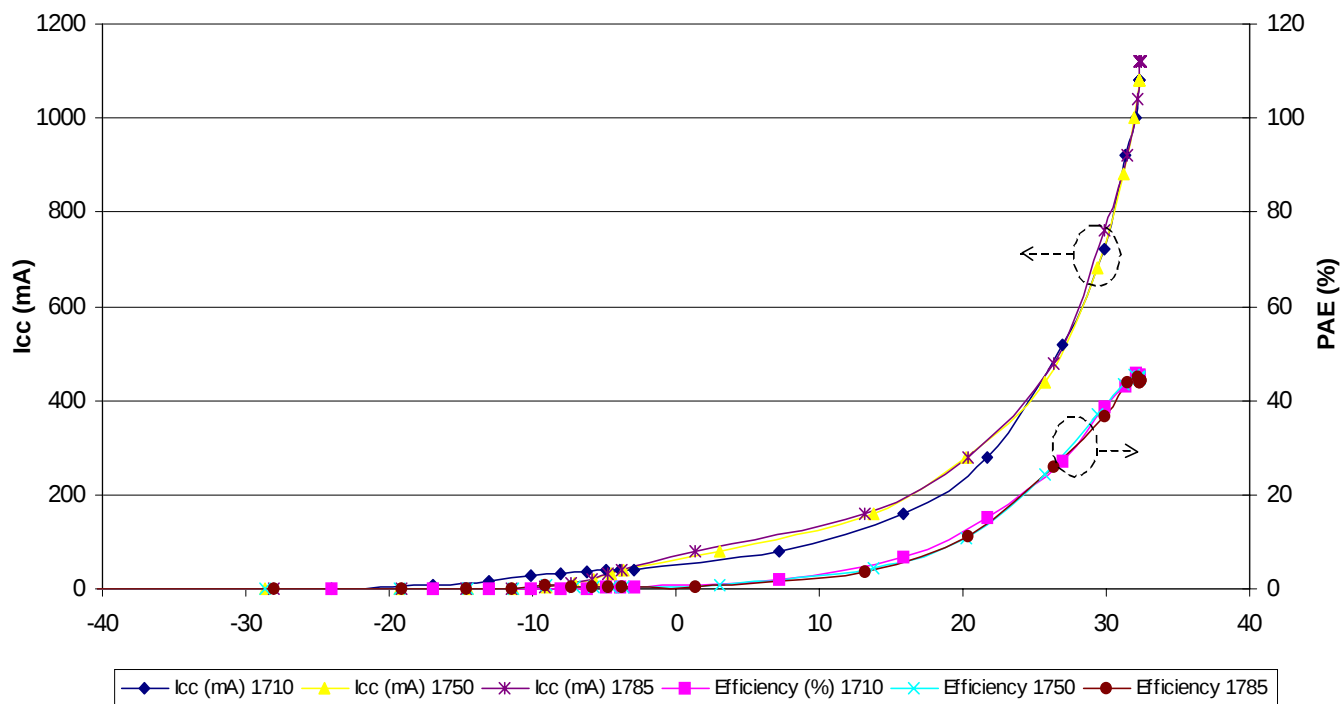


Figure 9

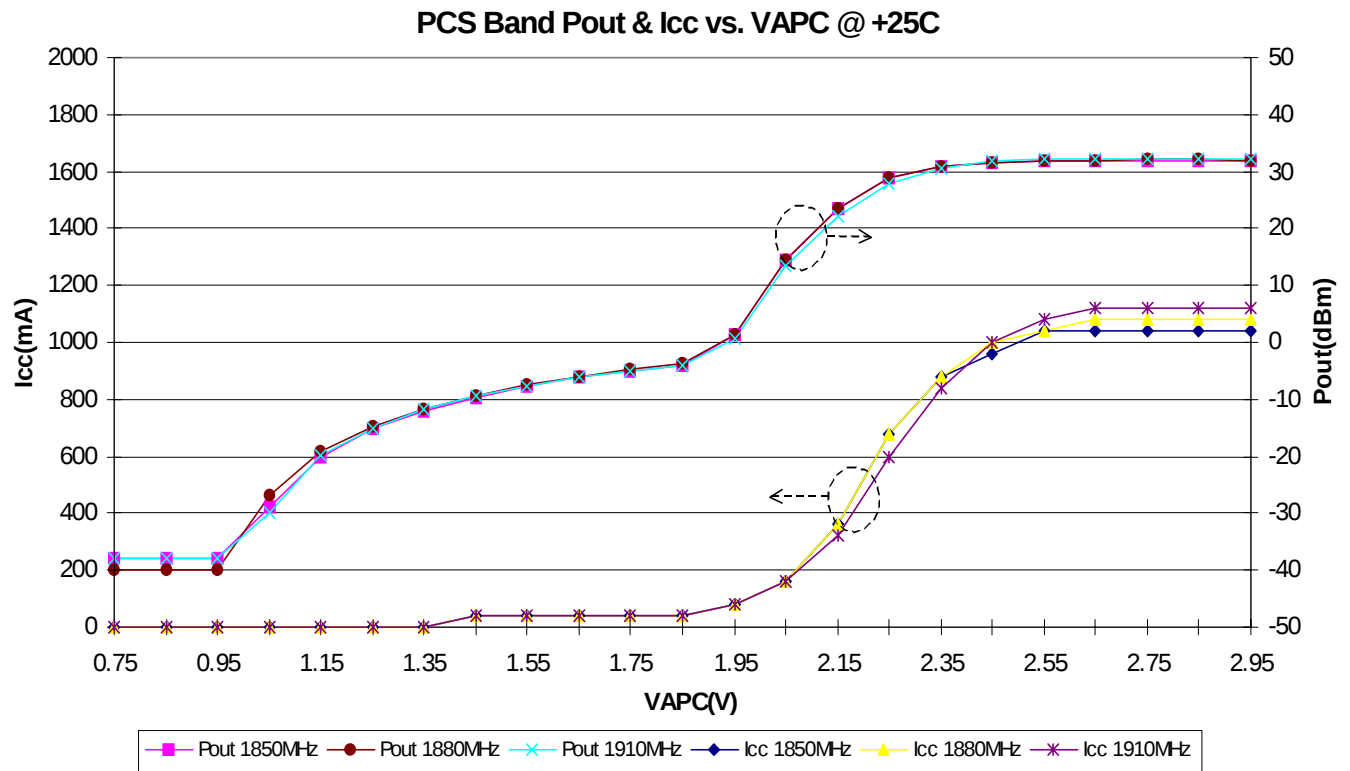


Figure 10

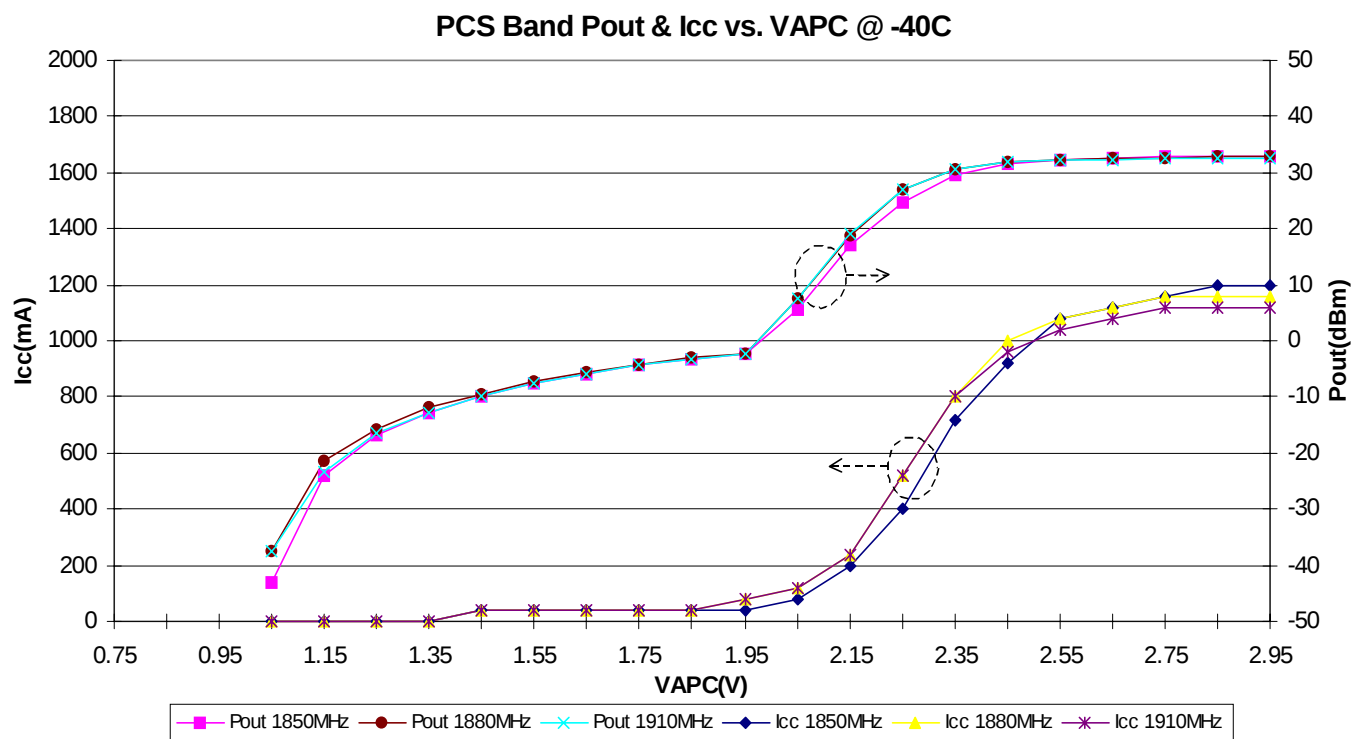


Figure 11

PCS Band Pout & Icc vs. VAPC @ +85C

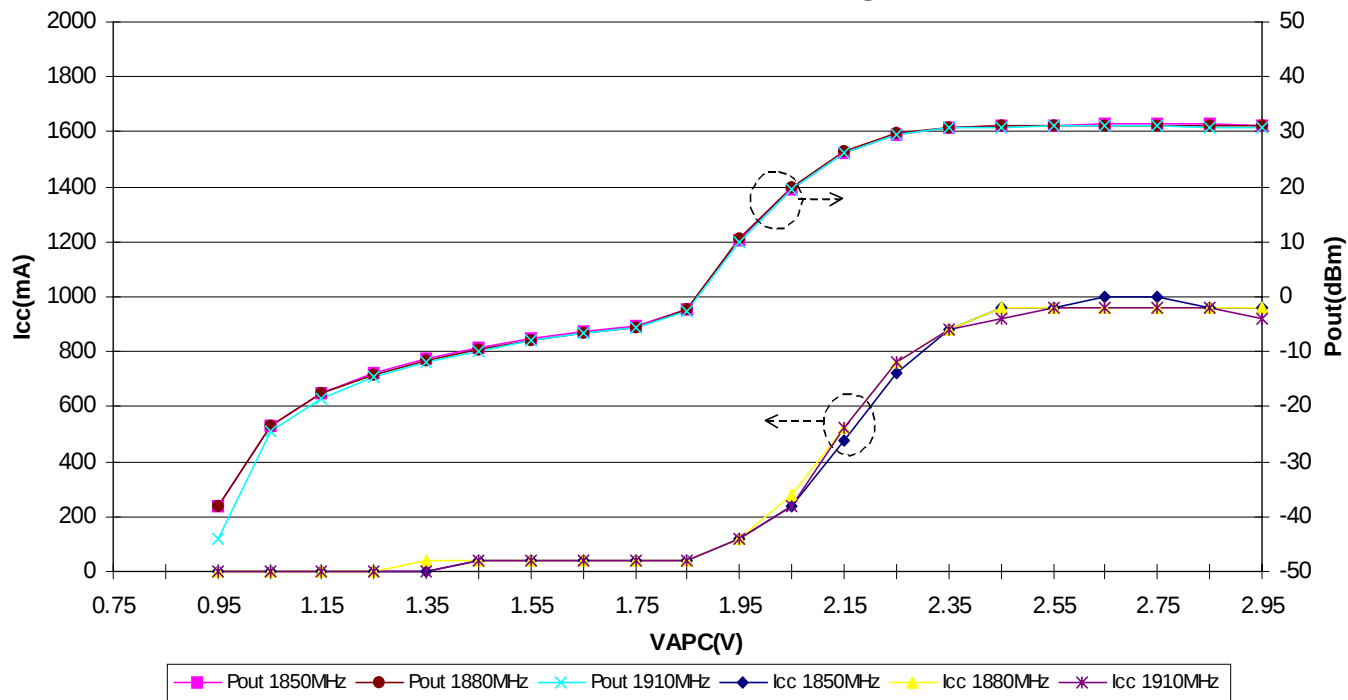


Figure 12

PCS Band Icc & Eff vs. Pout

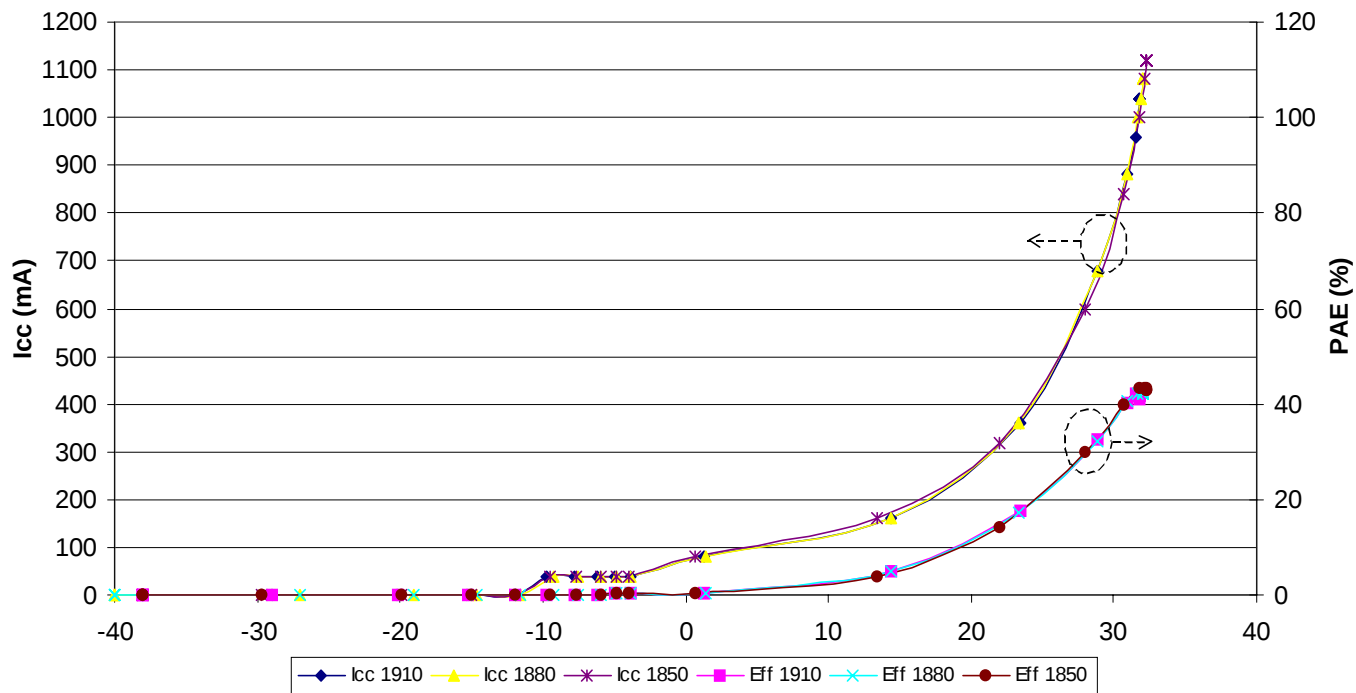


Figure 13

Pout vs. Class Operation

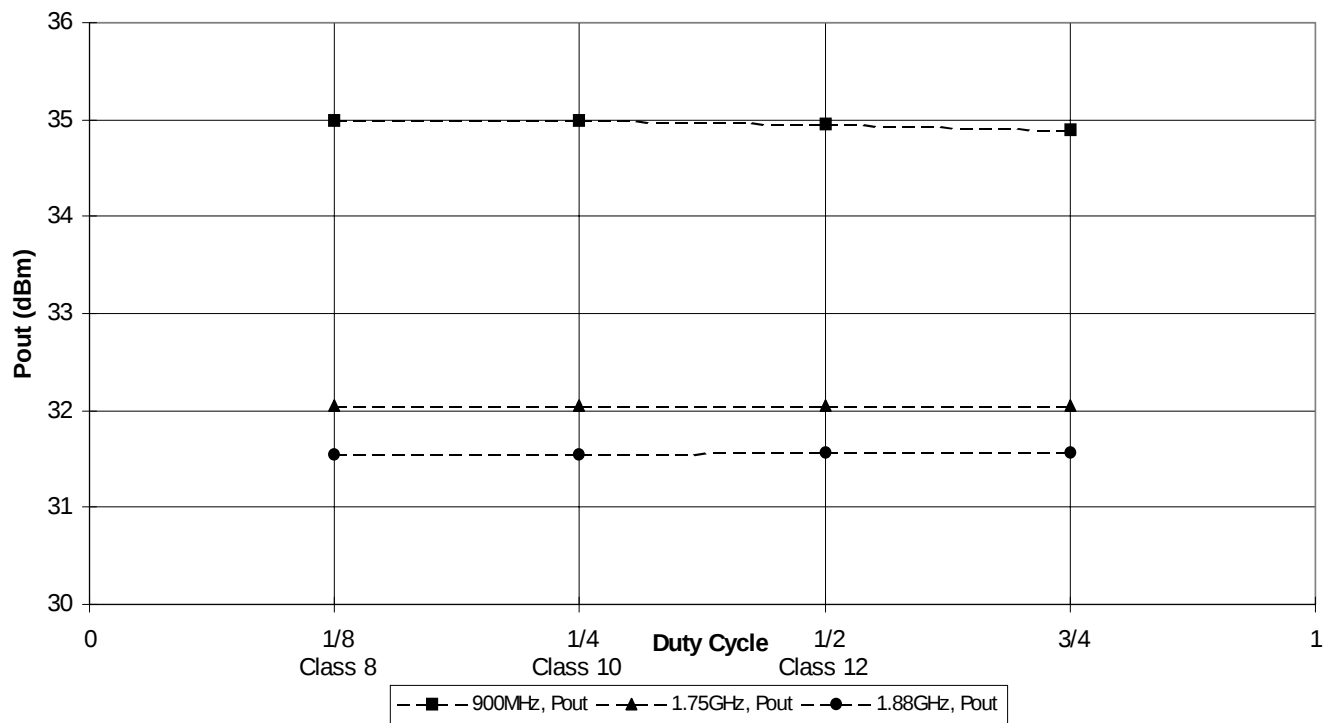


Figure 14

Icc vs. Class Operation

