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PTFC270051M

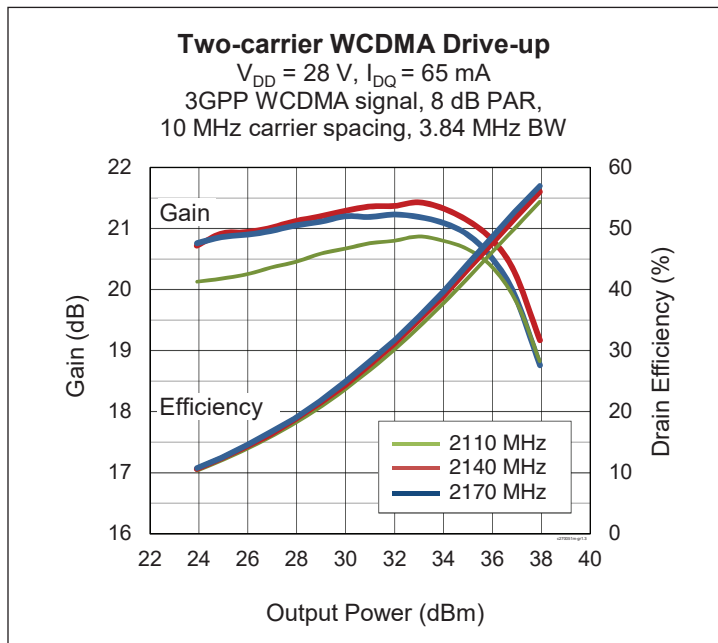
High Power RF LDMOS Field Effect Transistor 5 W, 28 V, 900 – 2700 MHz

Description

The PTFC270051M is an unmatched 5-watt LDMOS FET suitable for power amplifier applications with frequencies from 900 MHz to 2700 MHz. This LDMOS transistor offers excellent gain, efficiency and linearity performance in a small overmolded plastic package.



PTFC270051M
Package PG-SON-10



Features

- Unmatched
- Typical CW performance, 940 MHz, 28 V
 - Output power (P_{1dB}) = 6.5 W
 - Gain = 23 dB
 - Efficiency = 62%
- Typical CW performance, 2170 MHz, 28 V
 - Output power (P_{1dB}) = 7.3 W
 - Gain = 20.3 dB
 - Efficiency = 60%
- Typical CW performance, 2655 MHz, 28 V
 - Output power (P_{1dB}) = 7.3 W
 - Gain = 19.9 dB
 - Efficiency = 59.5%
- Capable of handling 10:1 VSWR @ 28 V, 5 W (CW) output power
- Integrated ESD protection: Human Body Model Class 1A (per JESD22-A114)
- Pb-free and RoHS compliant

RF Characteristics, 2170 MHz

CW Specifications (tested in Wolfspeed test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 65\text{ mA}$, $P_{OUT} = 5\text{ W}$, $f_1 = 2110\text{ MHz}$, $f_2 = 2170\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	18.5	19.5	—	dB

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!



DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1	μA
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	2	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 65\text{ mA}$	V_{GS}	2.2	2.7	3.2	V

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	-6 to +10	V
Operating Voltage	V_{DD}	0 to +32	V
Junction Temperature	T_J	225	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-65 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} 70^{\circ}\text{C}$, 5.5 W CW)	$R_{\theta JC}$	3.84	$^{\circ}\text{C/W}$

Moisture Sensitivity Level

Level	Test Standard	Package Temperature	Unit
3	IPC/JEDEC J-STD-020	260	$^{\circ}\text{C}$

Ordering Information

Type	Order Code	Package and Description	Shipping
PTFC270051M V2 R1K	PTFC270051M-V2-R1K	PG-SON-10, molded plastic, SMD	Tape & Reel, 1000 pcs

Evaluation Boards

Order Code	Frequency	Description
LTN/PTFC270051M V2	2110 – 2170 MHz	Class AB with combined outputs, R04360, 0.508 mm thick
LTN/PTFC270051M E3	2620 – 2690 MHz	Class AB with combined outputs, R04360, 0.508 mm thick
LTN/PTFC270051M E4	920 – 960 MHz	Class AB with combined outputs, R04360, 0.508 mm thick
LTN/PTFC270051M E5	1930 – 1990 MHz	Class AB with combined outputs, R04360, 0.508 mm thick
LTN/PTFC270051M E6	1805 – 1880 MHz	Class AB with combined outputs, R04360, 0.508 mm thick

Find Gerber files for these reference fixtures on the Wolfspeed Web site at www.wolfspeed.com/RF

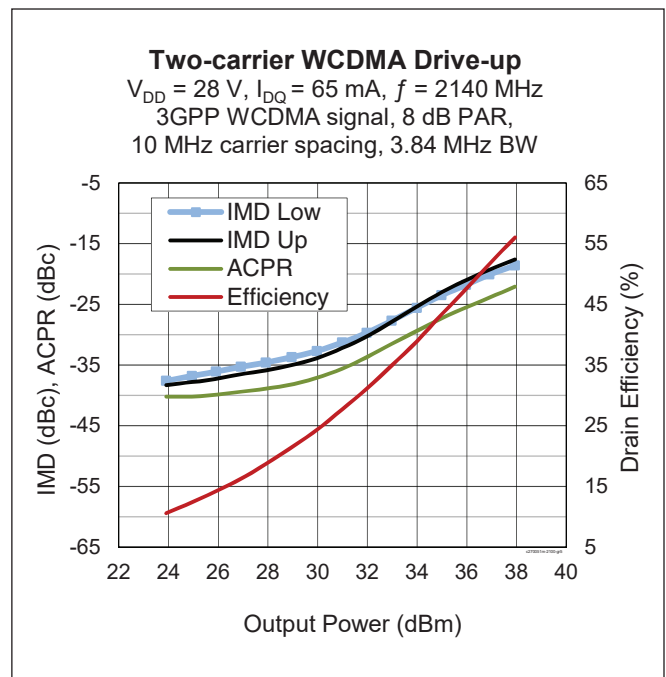
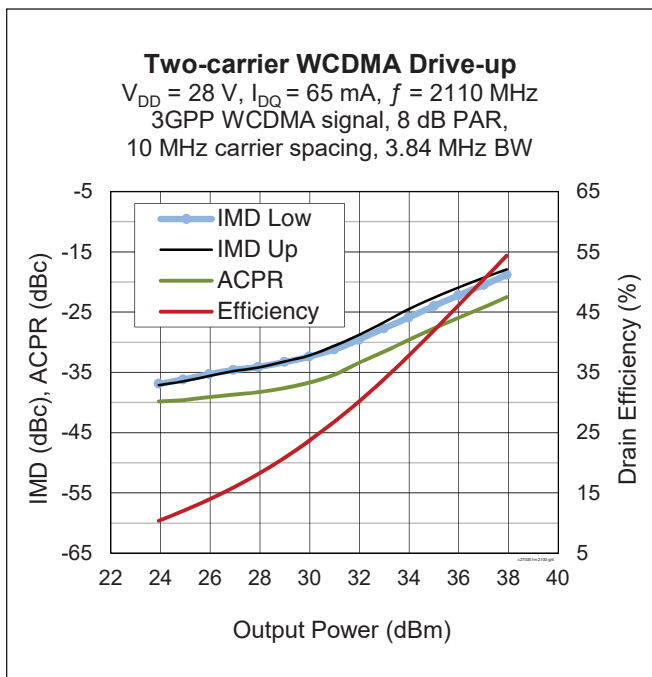
RF Characteristics, 2170 MHz

Two-carrier WCDMA Specifications (not subject to production test—verified by design/characterization in Wolfspeed test fixture)

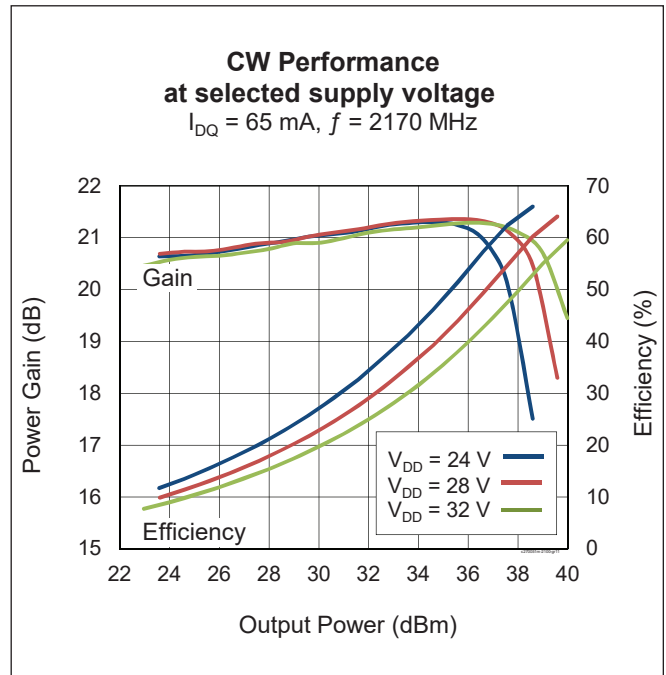
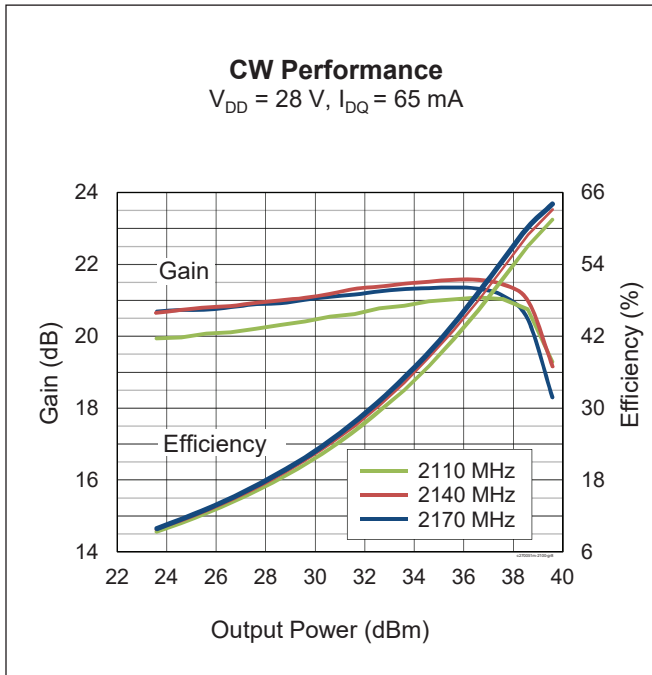
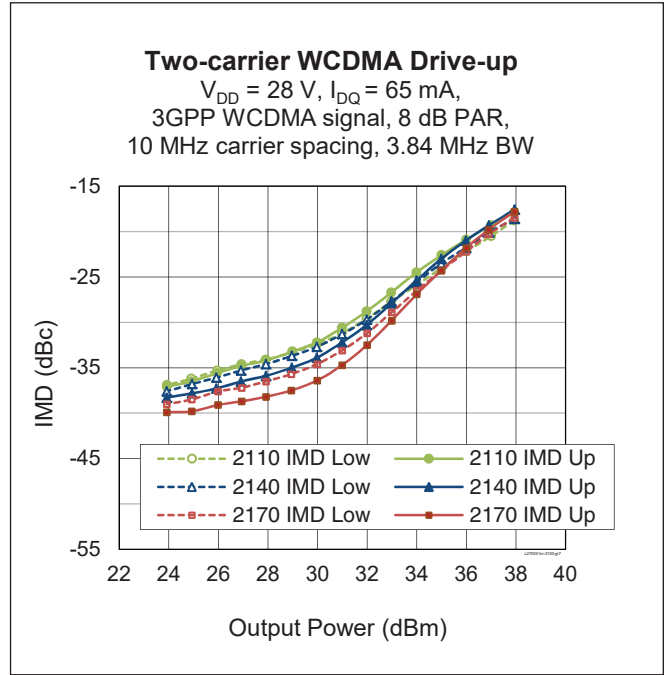
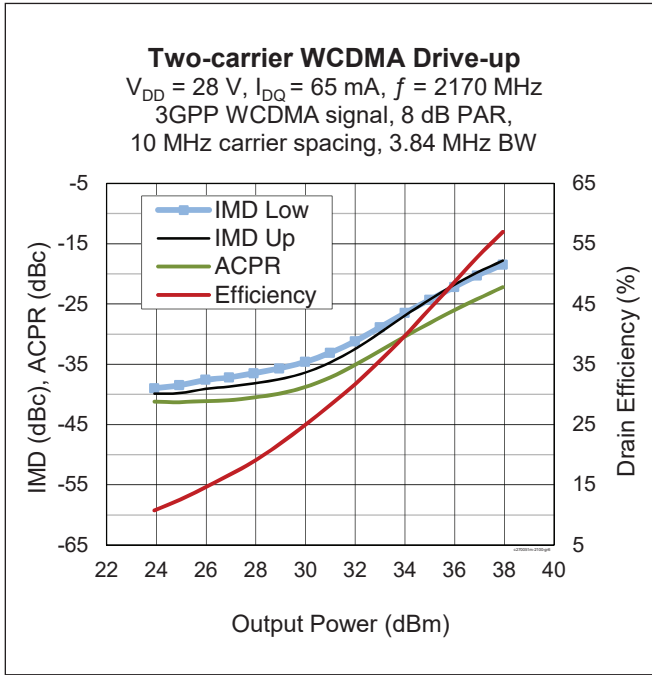
$V_{DD} = 28\text{ V}$, $I_{DQ} = 65\text{ mA}$, $P_{OUT} = 0.8\text{ W avg}$, $f_1 = 2157.5\text{ MHz}$, $f_2 = 2167.5\text{ MHz}$
 3GPP WCDMA signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	21	—	dB
Drain Efficiency	η_D	—	21.5	—	%
Intermodulation Distortion	IMD	—	-35.5	—	dBc

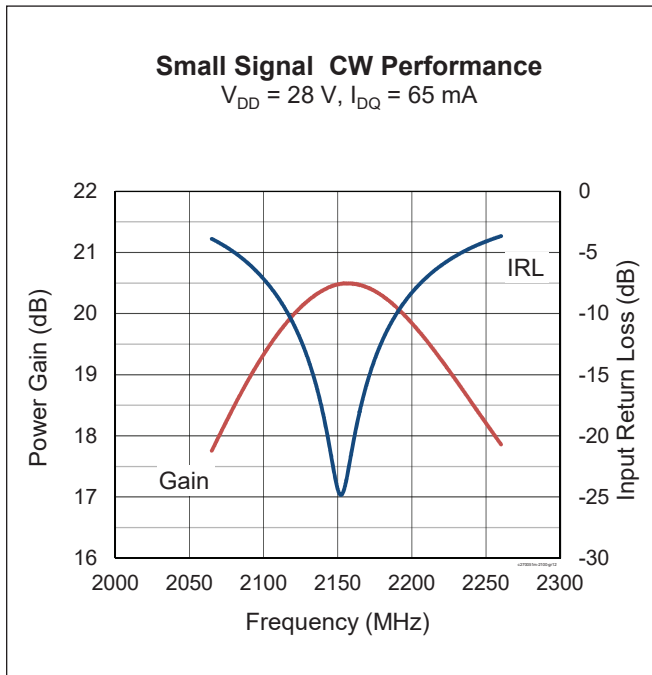
Typical Performance, 2170 MHz (data taken in a production test fixture)



Typical Performance, 2170 MHz (cont.)

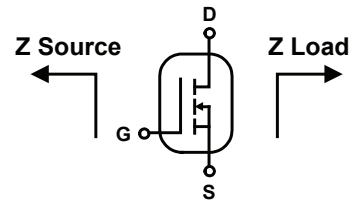


Typical Performance, 2170 MHz (cont.)



Broadband Circuit Impedance, 2170 MHz

Freq [MHz]	Z Source Ω		Z Load Ω	
	R	jX	R	jX
2110	1.5	-2.6	9.5	5.4
2140	1.5	-2.7	8.7	5.5
2170	1.5	-2.9	7.7	5.6



Load Pull Performance

Pulsed CW signal: 160 μsec , 10% duty cycle; 28 V, 65 mA

Class AB		$P_{1\text{dB}}$									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	PAE [%]	POUT [dBm]	POUT [W]	Zl [Ω]	Gain [dB]	PAE [%]	POUT [dBm]	POUT [W]
2110	$1.5 - j2.6$	$10.6 + j2.6$	20.6	55.0	39.50	8.9	$8.3 + j8.2$	22.5	64.9	38.50	7.1
2140	$1.4 - j2.7$	$9.8 + j2.8$	20.5	56.4	39.46	8.8	$7.6 + j8.8$	22.9	64.1	37.90	6.2
2170	$1.4 - j2.9$	$9.2 + j2.8$	20.7	56.2	39.20	8.3	$6.2 + j8.3$	23.0	63.8	37.40	5.5

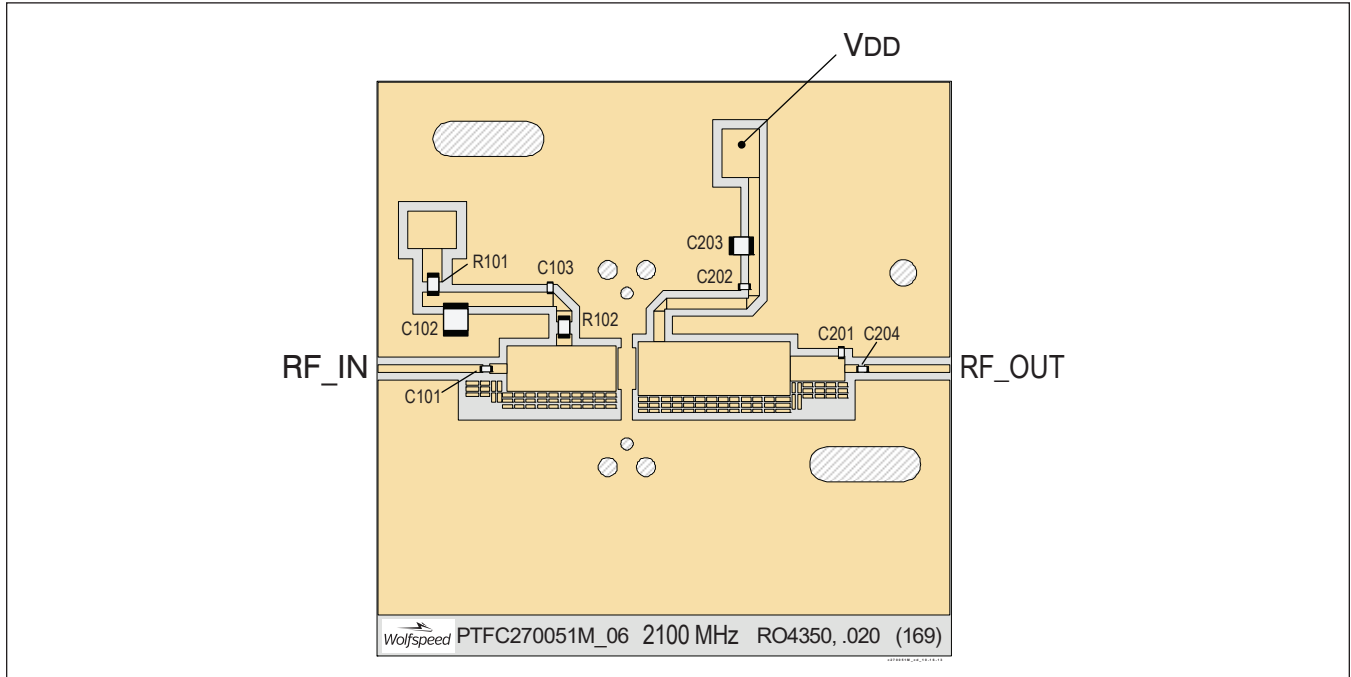
Reference Circuit, 2170 MHz

DUT PTFC270051M

Test Fixture Part No. LTN/PTFC270051M V2

PCB Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$

Find Gerber files for this test fixture on the Wolfspeed Web site at (www.wolfspeed.com/RF)



Production test circuit assembly diagram (not to scale)

Components Information

Component	Description	Supplier	P/N
C101	Chip capacitor, 1 pF	ATC	ATC600S1R0BI250X
C102	Chip capacitor, 2.2 μ F	TDK Corporation	C4532X7R1H225M160KA
C103	Chip capacitor, 12 pF	ATC	ATC600S120BT250X
C201	Chip capacitor, 1.1 pF	ATC	ATC600S1R1BT250X
C202	Chip capacitor, 12 pF	ATC	ATC600S120BT250X
C203	Capacitor, 10 μ F	Taiyo Yuden	UMK325C7106MM-T
C204	Chip capacitor, 12 pF	ATC	ATC600S120BT250X
R101, R102	Resistor, 10 Ω	Panasonic	ERJ-8GEYJ100V



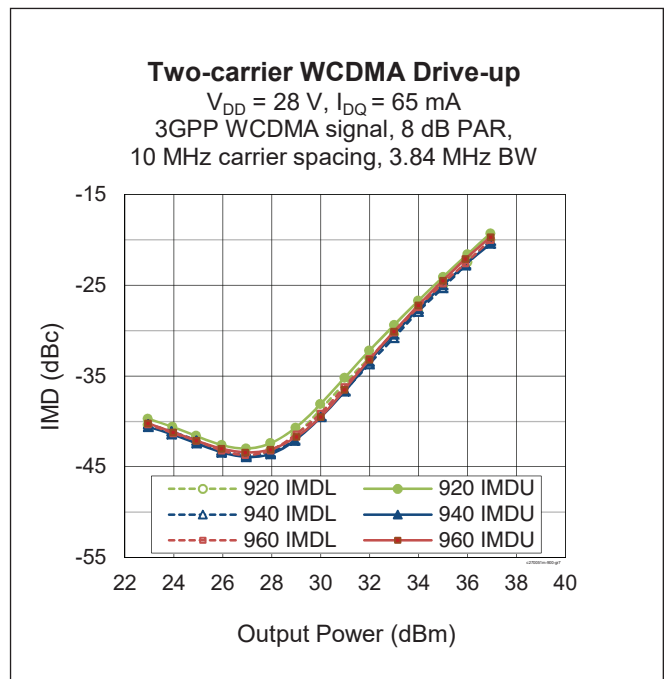
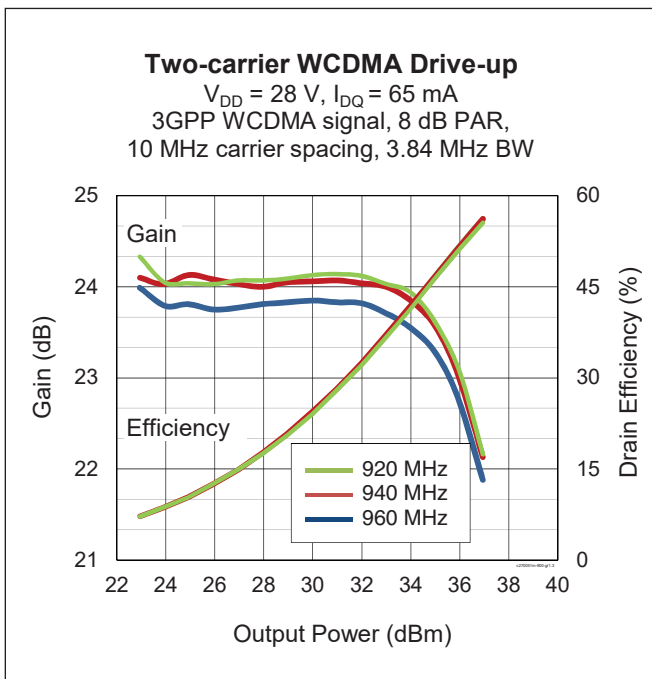
RF Characteristics, 940 MHz

Two-carrier WCDMA Specifications (not subject to production test—verified by design/characterization in Wolfspeed test fixture)

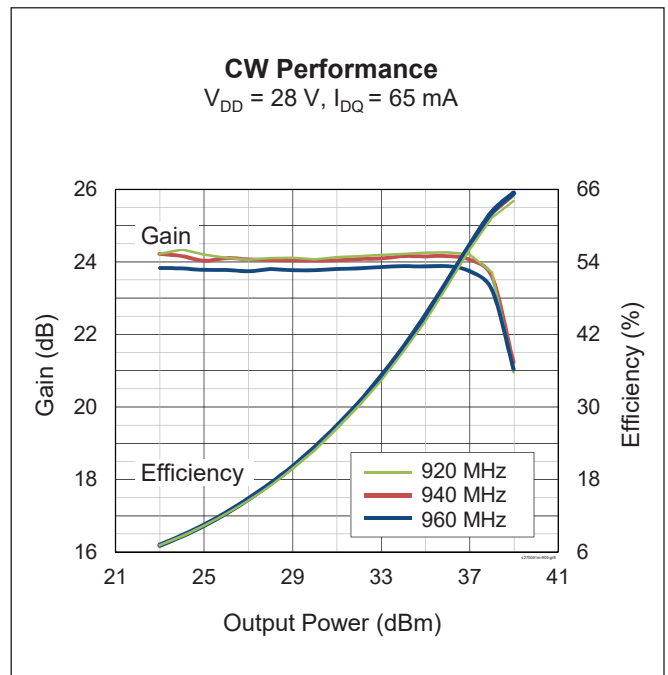
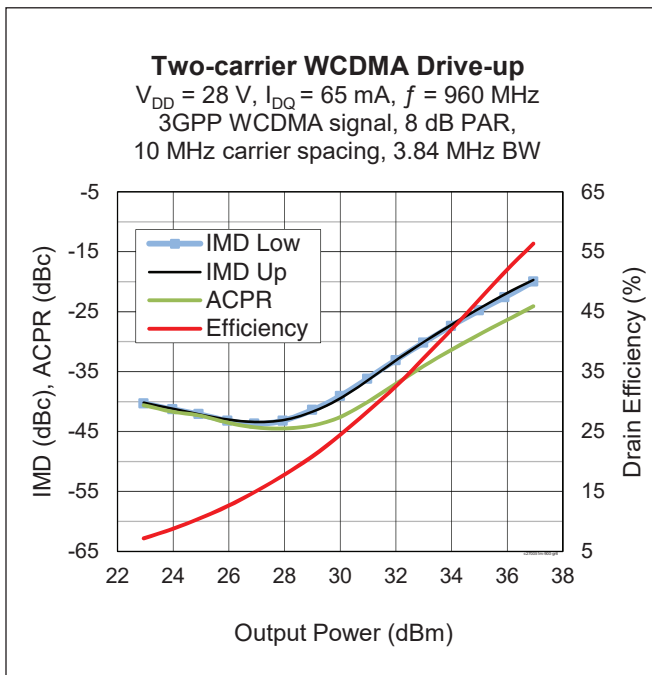
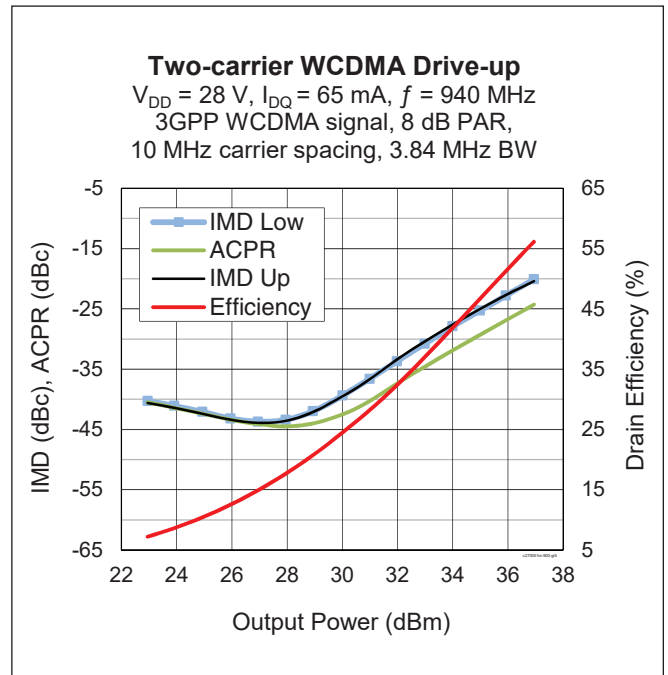
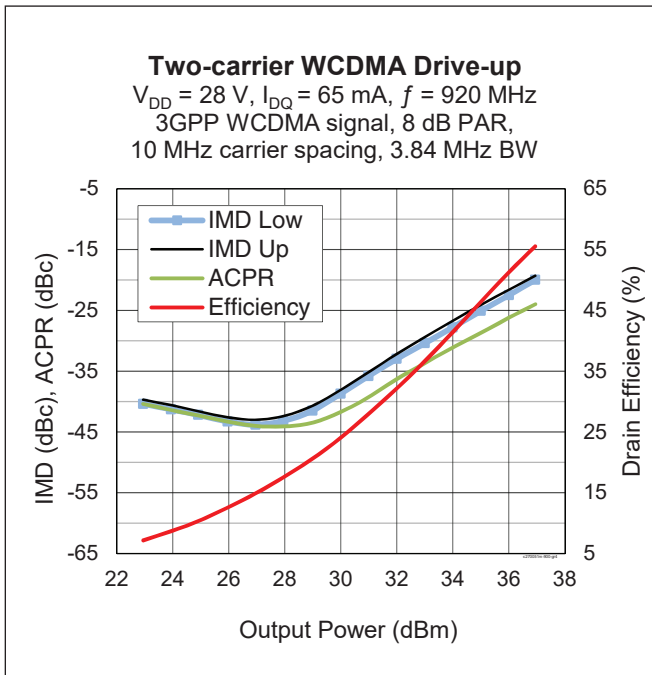
$V_{DD} = 28\text{ V}$, $I_{DQ} = 65\text{ mA}$, $P_{OUT} = 0.8\text{ W avg}$, $f_1 = 935\text{ MHz}$, $f_2 = 945\text{ MHz}$
 3GPP WCDMA signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	24	—	dB
Drain Efficiency	η_D	—	20.7	—	%
Intermodulation Distortion	IMD	—	-42	—	dBc

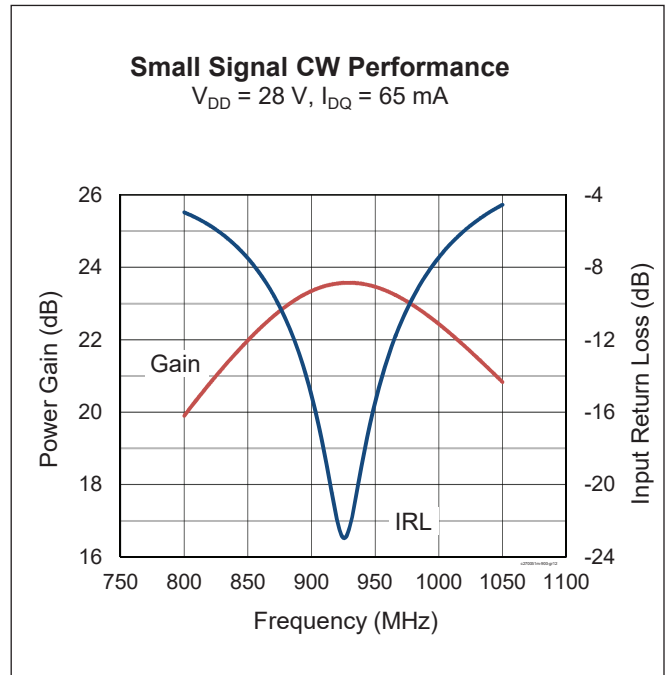
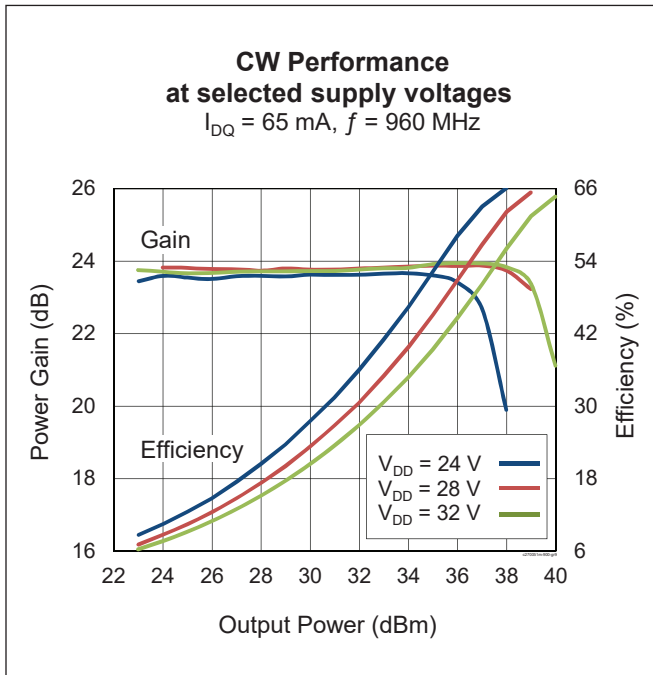
Typical Performance, 940 MHz



Reference Circuit, 940 MHz (cont.)

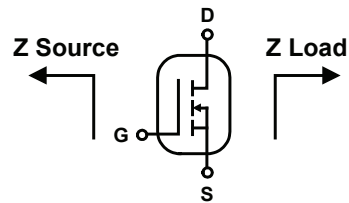


Typical Performance, 940 MHz (cont.)



Broadband Circuit Impedance

Freq [MHz]	Z Source Ω		Z Load Ω	
	R	jX	R	jX
920	3.3	10	25.6	13.2
940	3.4	10.2	24.7	13.3
960	3.5	10.3	24.3	14.7



Loadpull Performance

Pulsed CW signal: 160 μsec , 10% duty cycle; 28 V, 65 mA

Class AB		$P_{1\text{dB}}$									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	PAE [%]	POUT [dBm]	POUT [W]	Zl [Ω]	Gain [dB]	PAE [%]	POUT [dBm]	POUT [W]
920	$3.35 + j10$	$25.7 + j4.7$	25.5	62.2	39.40	8.7	$25.6 + j21.7$	27.6	70.7	38.00	6.3
940	$3.4 + j10.2$	$24.8 + j6.3$	25.6	62.1	39.35	8.6	$24.6 + j20.4$	27.3	69.2	38.10	6.5
960	$3.55 + j10.3$	$24.4 + j6.6$	25.3	60.3	39.10	8.1	$24.1 + j22.8$	27.3	68.2	37.50	5.6

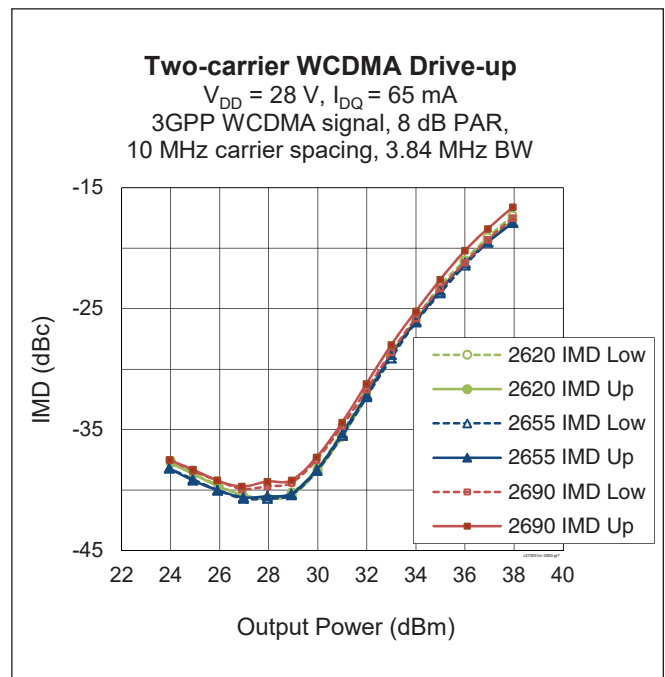
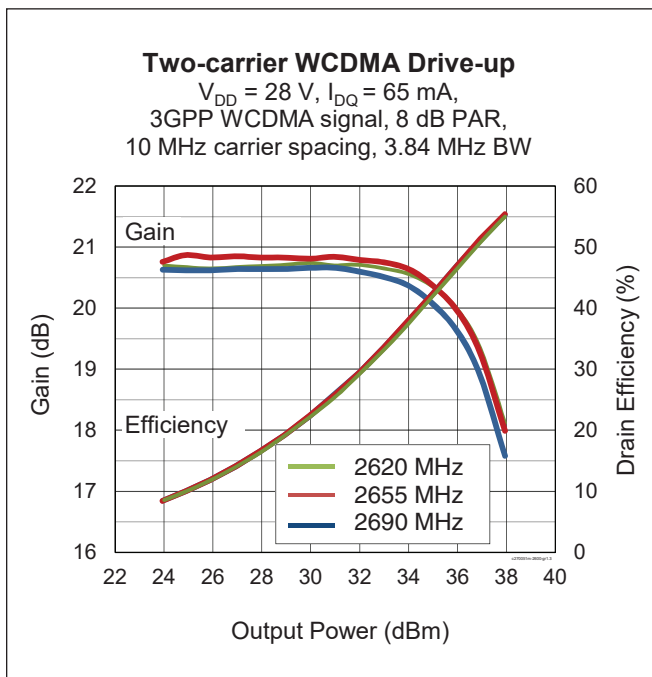
RF Characteristics, 2655 MHz

Two-carrier WCDMA Specifications (not subject to production test—verified by design/characterization in Wolfspeed test fixture)

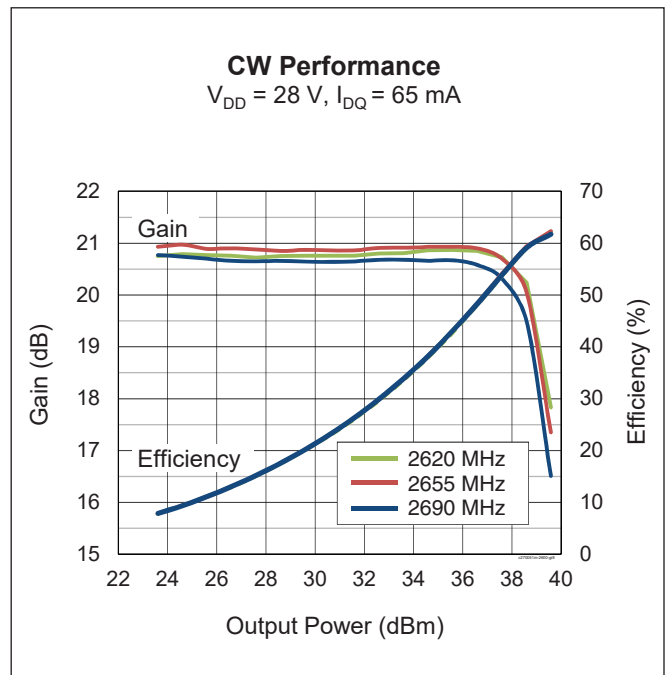
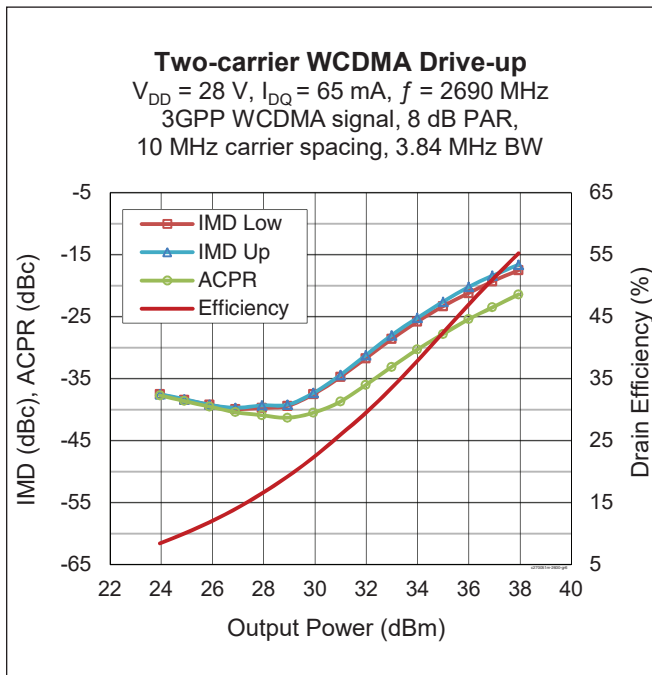
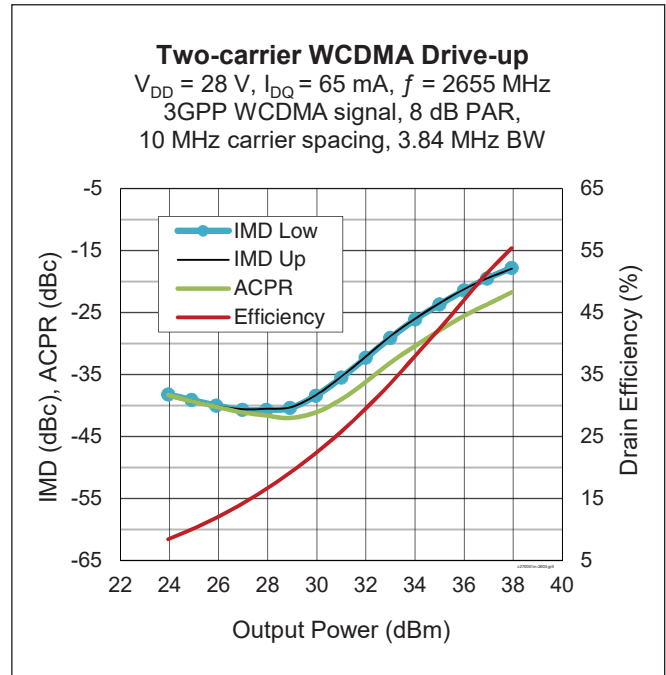
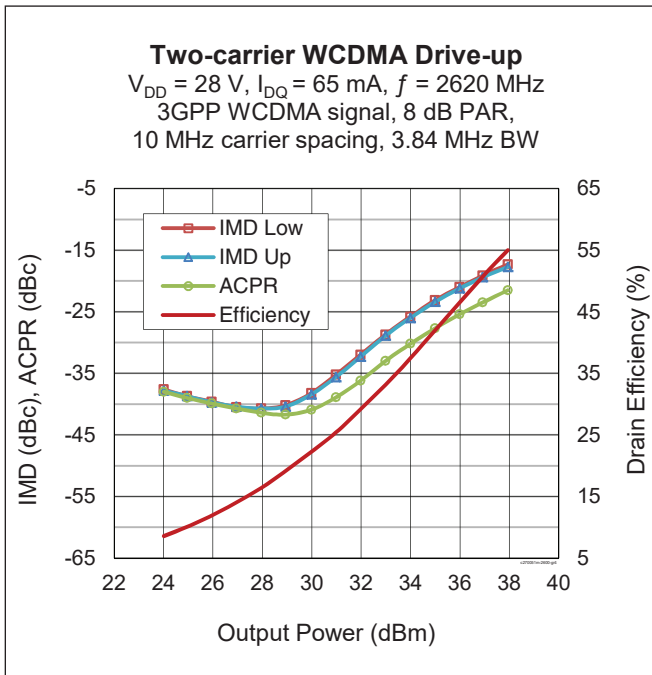
$V_{DD} = 28\text{ V}$, $I_{DQ} = 65\text{ mA}$, $P_{OUT} = 0.8\text{ W avg}$, $f_1 = 2650\text{ MHz}$, $f_2 = 2660\text{ MHz}$
 3GPP WCDMA signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	20.9	—	dB
Drain Efficiency	η_D	—	19	—	%
Intermodulation Distortion	IMD	—	-40	—	dBc

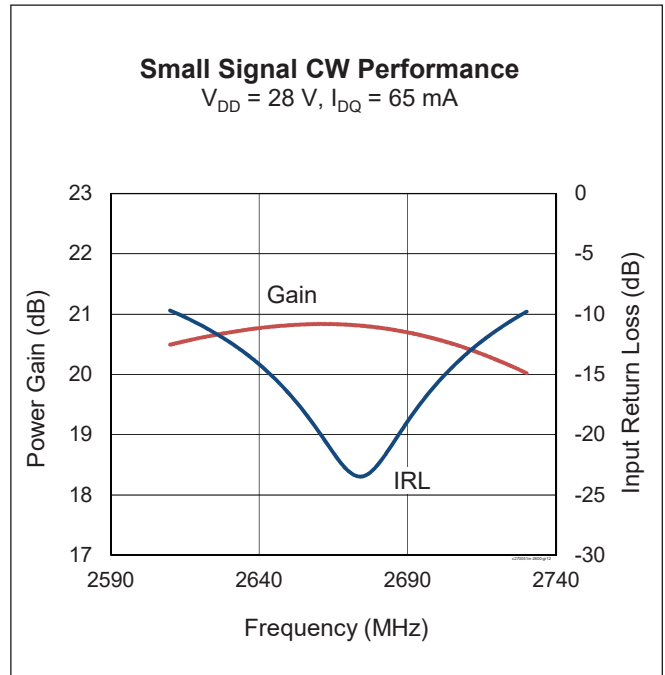
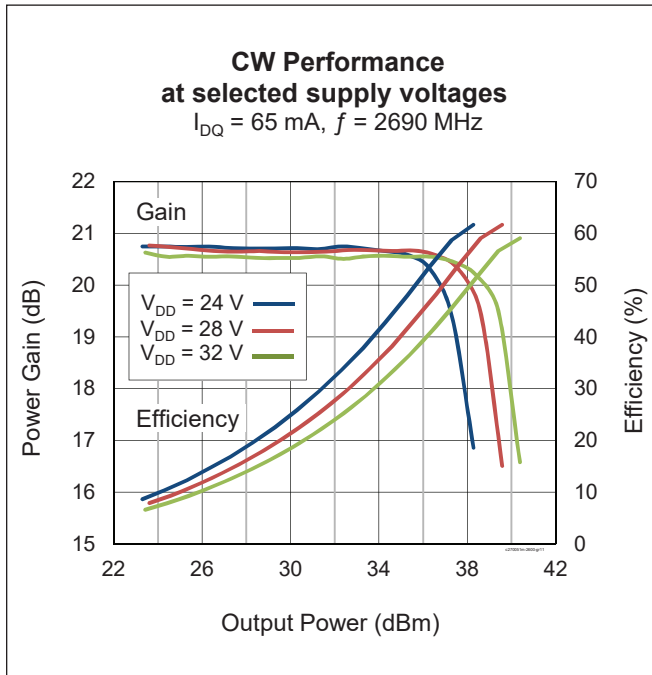
Typical Performance, 2655 MHz



Typical Performance, 2655 MHz (cont.)

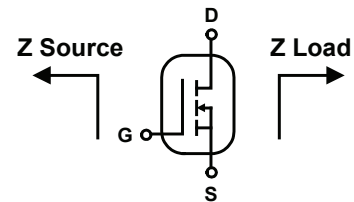


Typical Performance, 2655 MHz (cont.)



Broadband Circuit Impedance

Freq [MHz]	Z Source Ω		Z Load Ω	
	R	jX	R	jX
2490	1.5	-4.1	7.2	1.5
2590	1.5	-4.6	6.6	0.7
2690	1.5	-5.5	6.3	-0.6



Load Pull Performance

Pulsed CW signal: 160 μsec , 10% duty cycle; 28 V, 65 mA

Class AB		P_{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	PAE [%]	POUT [dBm]	POUT [W]	Zl [Ω]	Gain [dB]	PAE [%]	POUT [dBm]	POUT [W]
2490	$1.5 - j4.1$	$8.2 + j0.3$	19.7	55.6	39.0	7.94	$6.2 + j2.8$	20.9	62.2	38.4	6.9
2590	$1.5 - j4.6$	$6.9 - j0.8$	18.8	55.6	39.0	7.94	$5.0 + j2.1$	21.0	63.4	37.9	6.2
2690	$1.5 - j5.5$	$7.8 - j2.0$	18.4	55.6	39.0	7.94	$4.9 + j0.8$	20.4	63.6	37.8	6.0

Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2015-03-20	Production	All	Specifications and performance represent released product.
01.1	2016-07-26	Production	2	Add ordering information for additional evaluation boards.
02	2018-06-20	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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