

# PTVA082407NF

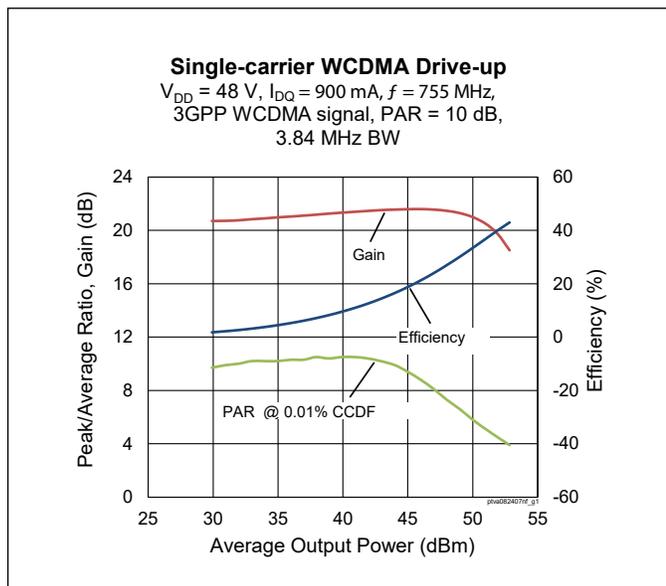
Thermally-Enhanced High Power RF LDMOS FET  
240 W, 48 V, 746 – 821 MHz



Package Types: PG-HBSOF-4-2

## Description

The PTVA082407NF is a 240-watt LDMOS FET manufactured with the 48-V LDMOS process. It is designed for use in multi-standard cellular power amplifier applications. It features a single ended design and input matching that allow for use from 746 MHz to 821 MHz. Manufactured with an advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



## Features

- Broadband internal input matching
- Typical CW performance, 755 MHz, 48 V
  - Output power at  $P_{1dB} = 225\text{ W}$
  - Output power at  $P_{3dB} = 250\text{ W}$
  - Gain = 20.5 dB
  - Efficiency = 43%
- Capable of handling 10:1 VSWR @ 48 V, 80 W CW output power
- Integrated ESD protection
- Human Body Model class 2 (per ANSI/ESDA/ JEDEC JS-001)
- Low thermal resistance
- Pb-free and RoHS compliant

## RF Characteristics

### Single-carrier WCDMA Specifications (tested in the production test fixture)

$V_{DD} = 48\text{ V}$ ,  $I_{DQ} = 900\text{ mA}$ ,  $P_{OUT} = 80\text{ W}$  avg,  $f = 755\text{ MHz}$ , 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Linear Gain	$G_{ps}$	21	22.5	—	dB
Drain Efficiency	$\eta_D$	33	35.5	—	%
Adjacent Channel Power Ratio	ACPR	—	-31.5	-29.5	dBc

Note:

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!



## DC Characteristics

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Conditions
Drain-Source Breakdown Voltage	$V_{BR(DSS)}$	105	—	—	V	$V_{GS} = 0\text{ V}, I_{DS} = 10\text{ mA}$
Drain Leakage Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$
		—	—	10		$V_{DS} = 105\text{ V}, V_{GS} = 0\text{ V}$
Gate Leakage Current	$I_{GSS}$	—	—	1		$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$
On-State Resistance	$R_{DS(on)}$	—	0.16	—	$\Omega$	$V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$
Operating Gate Voltage	$V_{GS}$	3.3	3.7	4	V	$V_{DS} = 48\text{ V}, I_{DQ} = 0.9\text{ A}$

## Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source Voltage	$V_{DSS}$	105	V
Gate-source Voltage	$V_{GS}$	-6 to +12	
Operating Voltage	$V_{DD}$	0 to +55	
Junction Temperature	$T_J$	225	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 to +150	

1. Operation above the maximum values listed here may cause permanent damage. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the component. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. For reliable continuous operation, the device should be operated within the operating voltage range ( $V_{DD}$ ) specified above.
2. Parameters values can be affected by end application and product usage. Values may change over time.

## Thermal Characteristics

Parameter	Symbol	Value	Unit	Conditions
Thermal Resistance	$R_{\theta JC}$	0.32	$^{\circ}\text{C}/\text{W}$	$T_{CASE} = 70^{\circ}\text{C}, 240\text{ W CW}$

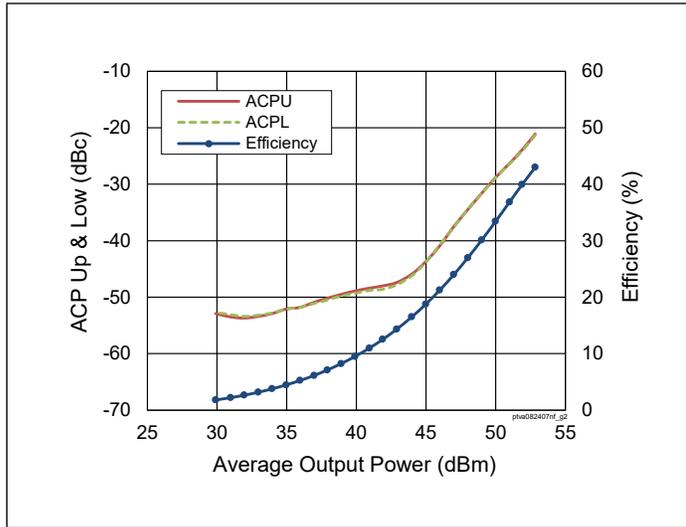
## Moisture Sensitivity Level

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

## Ordering Information

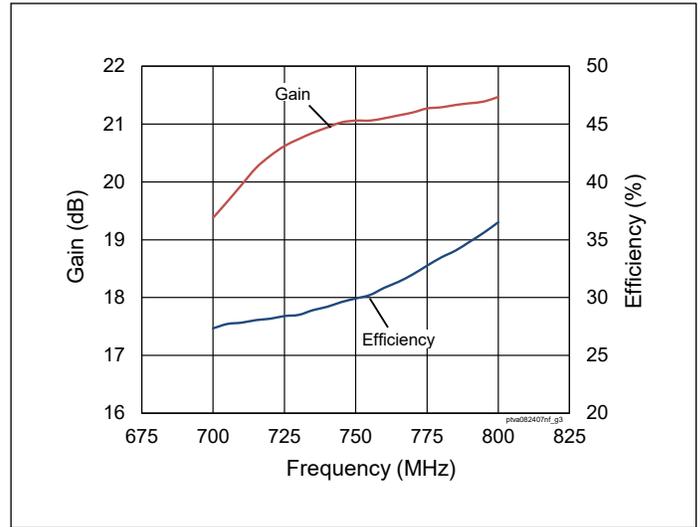
Type and Version	Order Code	Package Description	Shipping
PTVA082407NF V2 R5	PTVA082407NF-V2-R5	PG-HBSOF-4-2	Tape & Reel, 500 pcs

**Typical RF Performance** (data taken in production test fixture)



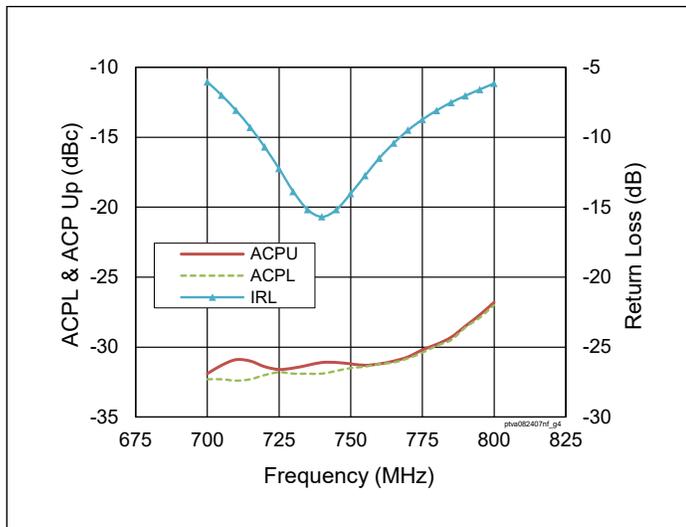
**Figure 1.** Single-carrier WCDMA Drive-up

$V_{DD} = 48\text{ V}$ ,  $I_{DQ} = 900\text{ mA}$ ,  $f = 755\text{ MHz}$ ,  
3GPP WCDMA signal, PAR = 10 dB,  
BW = 3.84 MHz



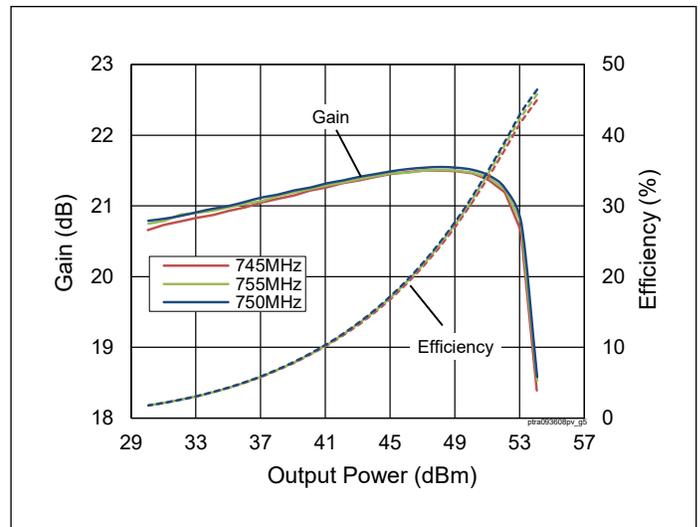
**Figure 2.** Single-carrier WCDMA Broadband Performance

$V_{DD} = 48\text{ V}$ ,  $I_{DQ} = 900\text{ mA}$ ,  $P_{OUT} = 49.03\text{ dBm}$ ,  
3GPP WCDMA signal, PAR = 10 dB



**Figure 3.** Single-carrier WCDMA Broadband Performance

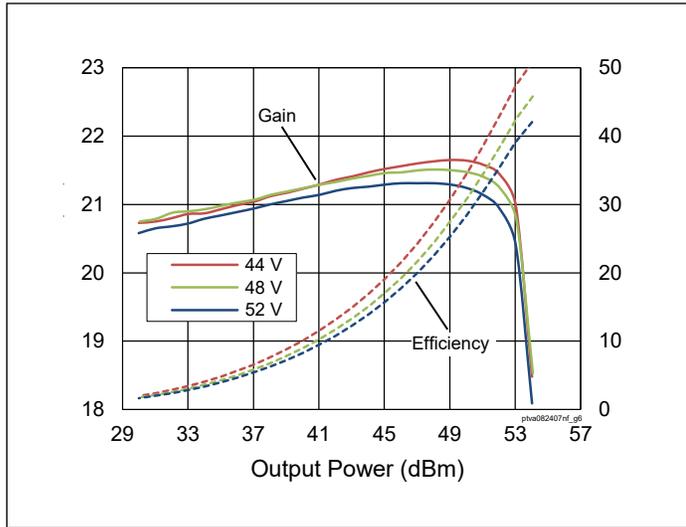
$V_{DD} = 48\text{ V}$ ,  $I_{DQ} = 900\text{ mA}$ ,  $P_{OUT} = 49.03\text{ dBm}$ ,  
3GPP WCDMA signal, PAR = 10 dB



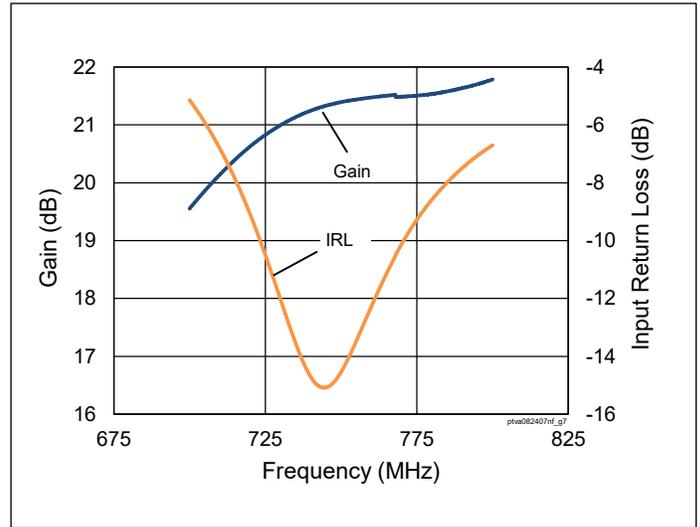
**Figure 4.** CW Performance

$V_{DD} = 48\text{ V}$ ,  $I_{DQ} = 900\text{ mA}$

**Typical Performance (cont.)**



**Figure 5. CW Performance at various  $V_{DD}$**   
 $I_{DQ} = 900 \text{ mA}$ ,  $f = 755 \text{ MHz}$



**Figure 6. CW Performance Small Signal Gain & Input Return Loss**  
 $V_{DD} = 48 \text{ V}$ ,  $I_{DQ} = 900 \text{ mA}$

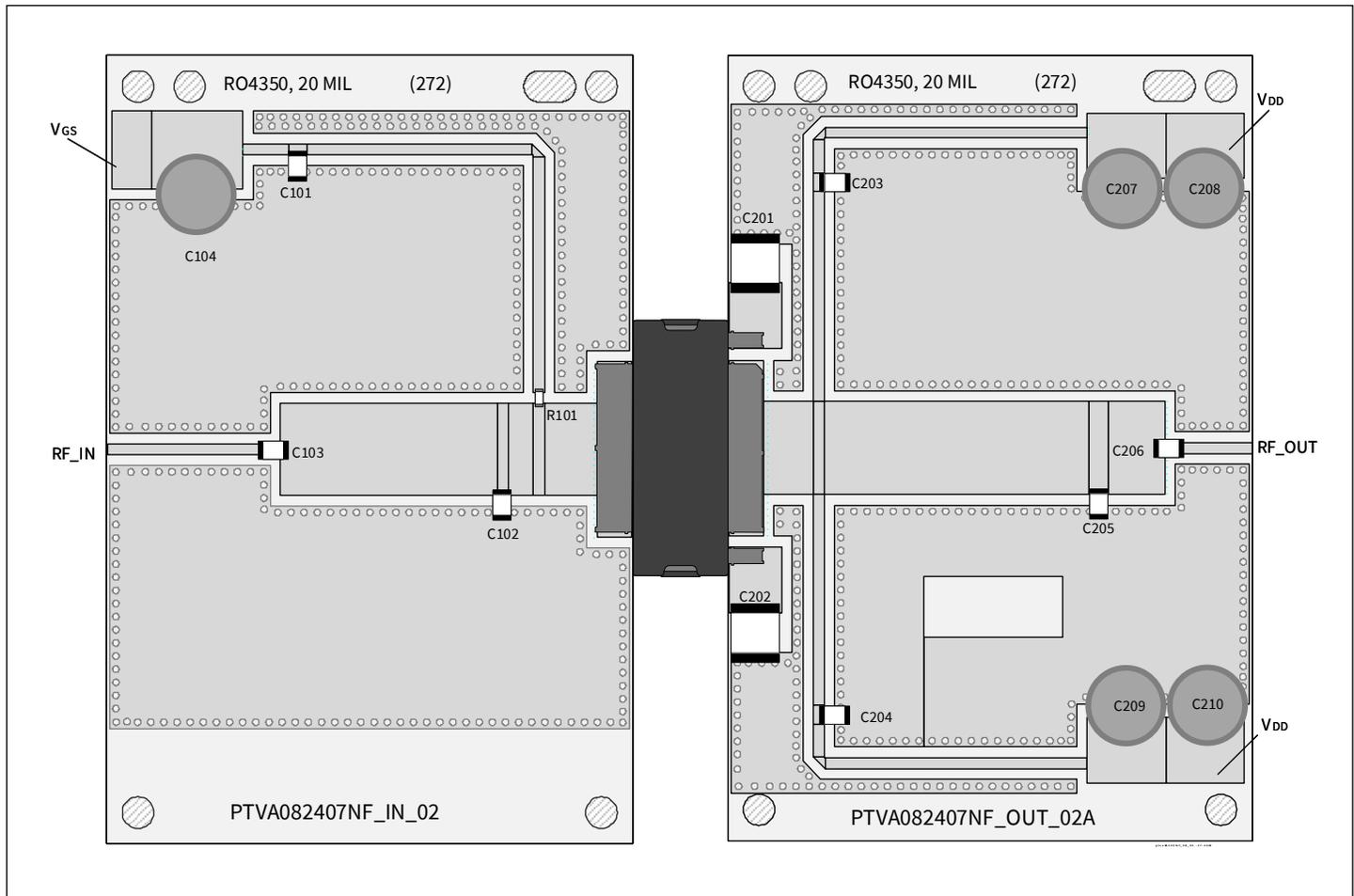
**Load Pull Performance**

**Load Pull Performance** – Pulsed CW signal: 10  $\mu\text{s}$ , 10% duty cycle, 48 V,  $I_{DQ} = 500 \text{ mA}$

		$P_{1dB}$									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	$Z_s [\Omega]$	$Z_l [\Omega]$	Gain [dB]	$P_{1dB} [\text{dBm}]$	$P_{1dB} [\text{W}]$	$\eta_D [\%]$	$Z_l [\Omega]$	Gain [dB]	$P_{1dB} [\text{dBm}]$	$P_{1dB} [\text{W}]$	$\eta_D [\%]$
740	$0.76 - j2.72$	$1.85 - j0$	21.29	55.11	324.3	61.1	$3.12 + j1.74$	23.18	53.18	208.0	71.0
760	$1.03 - j2.98$	$1.6 - j0$	21.26	55.38	345.1	59.5	$2.67 + j1.87$	23.42	53.05	201.8	71.2
820	$3.27 - j2.56$	$1.63 - j0.26$	21.95	54.76	299.2	57.0	$2.42 + j1.49$	24.13	52.91	195.4	68.6

		$P_{3dB}$									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	$Z_s [\Omega]$	$Z_l [\Omega]$	Gain [dB]	$P_{3dB} [\text{dBm}]$	$P_{3dB} [\text{W}]$	$\eta_D [\%]$	$Z_l [\Omega]$	Gain [dB]	$P_{3dB} [\text{dBm}]$	$P_{3dB} [\text{W}]$	$\eta_D [\%]$
740	$0.76 - j2.72$	$1.83 - j0.45$	19.09	55.73	374.1	60.3	$2.81 + j1.11$	20.82	54.47	279.9	71.7
760	$1.03 - j2.98$	$1.64 - j0.06$	19.29	55.98	396.3	61.4	$2.49 + j1.36$	21.10	54.20	263.0	71.5
820	$3.27 - j2.56$	$1.65 - j0.41$	19.85	55.49	354.0	58.6	$2.36 + j1.16$	21.91	53.94	247.7	69.2

## Evaluation Board, 746 – 821 MHz



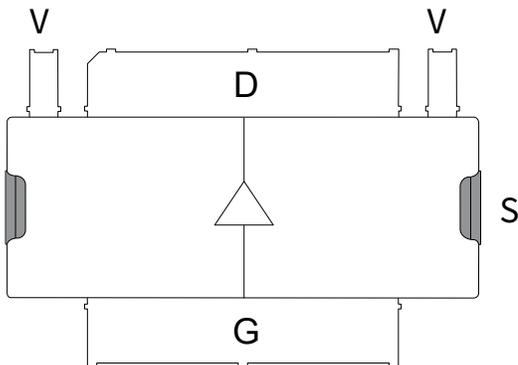
Reference circuit assembly diagram (not to scale)

Evaluation Board Part Number	LTN/PTVA082407NF-V2
PCB Information	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ , $f = 746 - 821$ MHz

## Components Information

Component	Description	Manufacturer	P/N
<b>Input</b>			
C101, C103	Capacitor, 56 pF	ATC	ATC100B560KW500XT
C102	Capacitor, 10 pF	ATC	ATC100B100KW500XT
C104	Capacitor, 100 $\mu$ F, 50 V	United Chemi-Con	EMVA500ADA101MHA0G
R101	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-8GEYJ100V
<b>Output</b>			
C201, C202	Capacitor, 100 $\mu$ F, 100 V	TDK Corporation	C5750X7S2A106M230KB
C203, C204, C206	Capacitor, 56 pF	ATC	ATC100B560KW500XT
C205	Capacitor, 6.8 pF	ATC	ATC100B6R8CW500XB
C207, C208, C209, C210	Capacitor, 100 $\mu$ F, 63 V	Panasonic Electronic Components	EEE-FK1J101P

## Pinout Diagram (top view)



Pin	Description
D	Drain
G	Gate
S	Source (flange)
V	Drain video decoupling (use only for decoupling), not for DC bias



## Package Outline Specifications – Package PG-HBSOF-4-2

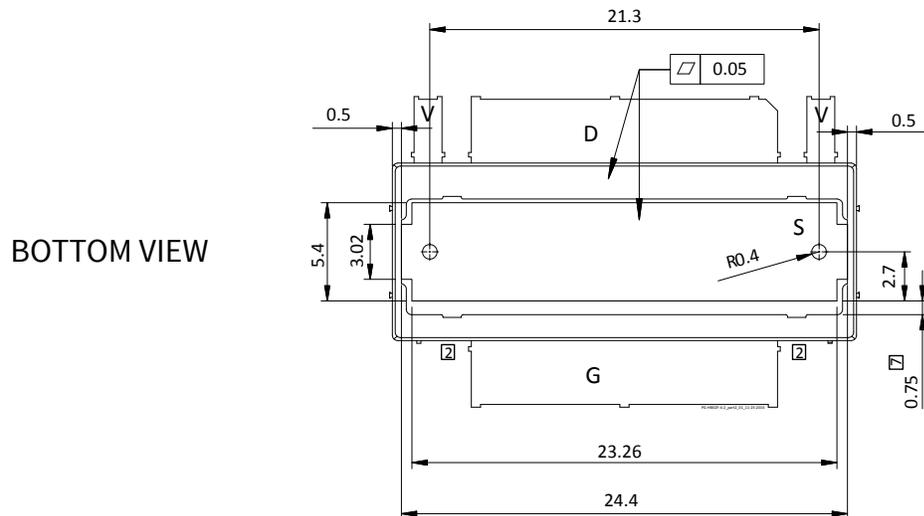


Diagram Notes—unless otherwise specified:

1. Mold/dam bar/metal protrusion of 0.30 mm max per side not included.
2. Metal protrusion are connected to source and shall not exceed 0.10 mm max.
3. Fillets and radii: all radii are 0.3 mm max.
  4. Interpret dimensions and tolerances per ISO 8015.
  5. Dimensions are mm.
6. Does not include mold/dam bar/metal protrusion.
7. Exposed metal surface tin-plated, may not be covered by mold compound.
  8. All tolerances  $\pm 0.1$  mm unless specified otherwise.
  9. All metal surfaces are tin-plated, except area of cut.
  10. Lead thickness: 0.25 mm.
  11. Pins: D – drain; G – gate; S – source; V – drain video decoupling (use only for decoupling), not for DC bias

## Notes & Disclaimer

---

MACOM Technology Solutions Inc. ("MACOM"). All rights reserved.

These materials are provided in connection with MACOM's products as a service to its customers and may be used for informational purposes only. Except as provided in its Terms and Conditions of Sale or any separate agreement, MACOM assumes no liability or responsibility whatsoever, including for (i) errors or omissions in these materials; (ii) failure to update these materials; or (iii) conflicts or incompatibilities arising from future changes to specifications and product descriptions, which MACOM may make at any time, without notice. These materials grant no license, express or implied, to any intellectual property rights.

THESE MATERIALS ARE PROVIDED "AS IS" WITH NO WARRANTY OR LIABILITY, EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHT, ACCURACY OR COMPLETENESS, OR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.