

# PTVA084007NF

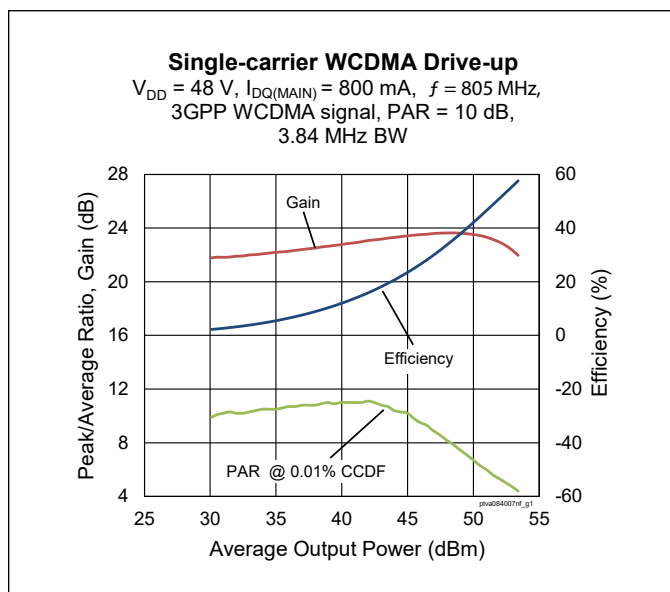
Thermally-Enhanced High Power RF LDMOS FET  
370 W, 48 V, 755 – 805 MHz



Package Types: PG-HBSOF-4-2

## Description

The PTVA084007NF is a 370-watt ( $P_{3dB}$ ) 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 and output matching that allow for use from 755 MHz to 805 MHz.



## Features

- Broadband internal input and output matching
- Target CW performance, 805 MHz, 48 V, single side
  - Output power at  $P_{3dB} = 370\text{ W}$
  - Efficiency = 64%
  - Gain = 20.8 dB
- Capable of handling 10:1 VSWR @ 48 V, 100 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)

$V_{DD} = 48\text{ V}$ ,  $I_{DQ} = 800\text{ mA}$ ,  $P_{OUT} = 80\text{ W avg}$ ,  $f_1 = 805\text{ MHz}$ , 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF.

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Gain	$G_{ps}$	22	23.6	—	dB
Drain Efficiency	$\eta_D$	37	39	—	%
Adjacent Channel Power Ratio	ACPR	—	-31.6	-28.5	dBc
Output PAR @ 0.01% CCDF, 20 MHz	OPAR	6.4	7	—	dB

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	$\mu\text{A}$	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$
		—	—	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	$R_{DS(on)}$	—	0.12	—	$\Omega$	$V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$
Operating Gate Voltage	$V_{GS}$	3.07	3.67	4.27	V	$V_{DS} = 48\text{ V}, I_{DQ} = 0.7\text{ A}$

## 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	$R_{\theta JC}$	0.21	$^{\circ}\text{C}/\text{W}$	$T_{CASE} = 70\text{ }^{\circ}\text{C}, 370\text{ W CW}$

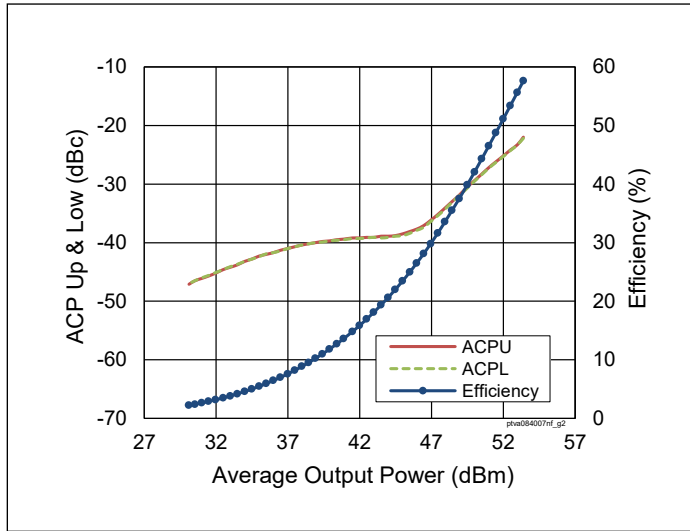
## Moisture Sensitivity Level

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

## Ordering Information

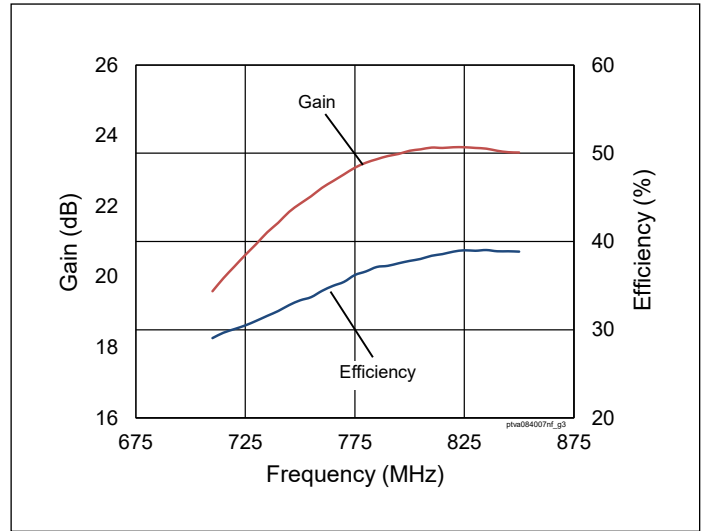
Type and Version	Order Code	Package Description	Shipping
PTVA084007NF V1 R5	PTVA084007NF-V1-R5	PG-HBSOF-4-2, plastic package	Tape & Reel, 500 pcs

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



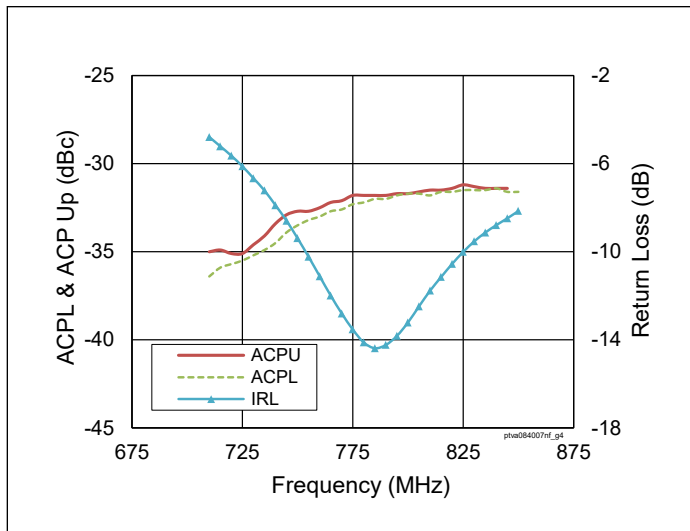
**Figure 1.** Single-carrier WCDMA Drive-up

$V_{DD} = 48\text{ V}$ ,  $I_{DQ(MAIN)} = 800\text{ mA}$ ,  $f = 805\text{ MHz}$ ,  
3GPP WCDMA signal, PAR = 10 dB,  
BW = 3.84 MHz



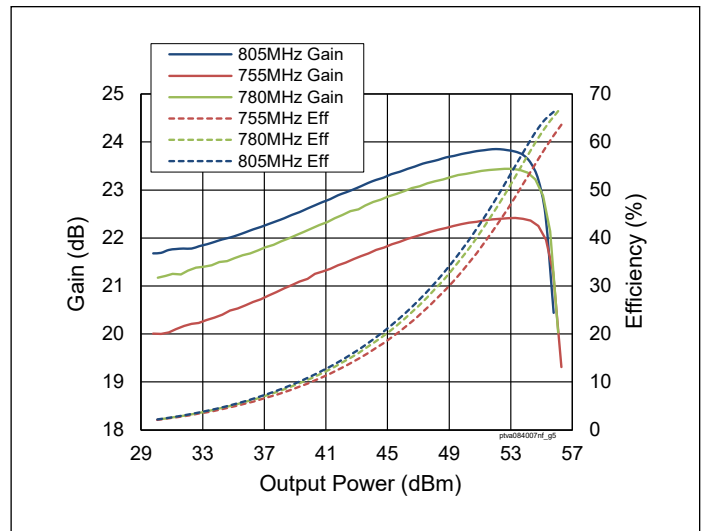
**Figure 2.** Single-carrier WCDMA Broadband Performance

$V_{DD} = 48\text{ V}$ ,  $I_{DQ(MAIN)} = 800\text{ mA}$ ,  $P_{OUT} = 49.03\text{ dBm}$ ,  
3GPP WCDMA signal, PAR = 10 dB



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

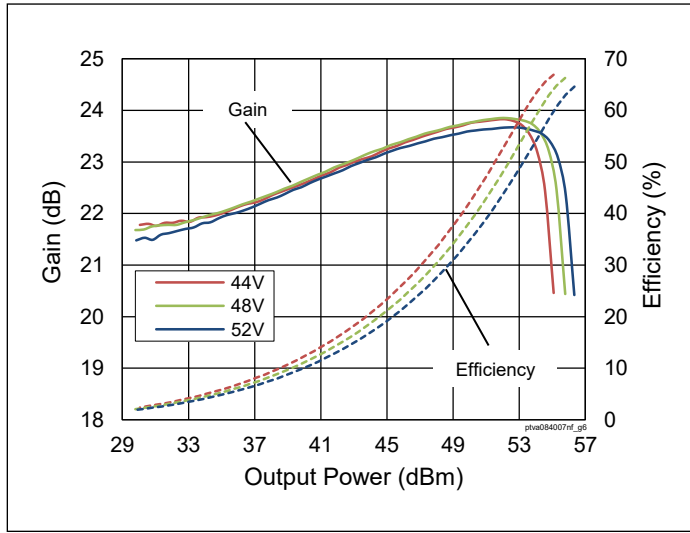
$V_{DD} = 48\text{ V}$ ,  $I_{DQ(MAIN)} = 800\text{ mA}$ ,  $P_{OUT} = 49.03\text{ dBm}$ ,  
3GPP WCDMA signal, PAR = 10 dB



**Figure 4.** CW Performance

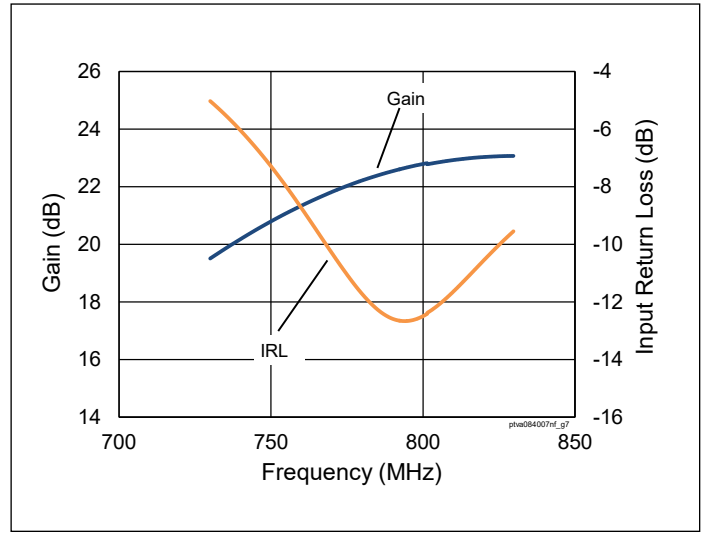
$V_{DD} = 48\text{ V}$ ,  $I_{DQ(MAIN)} = 800\text{ mA}$

**Typical RF Performance (cont.)**



**Figure 5. CW Performance at various  $V_{DD}$**

$I_{DQ(MAIN)} = 800 \text{ mA}$ ,  $f = 805 \text{ MHz}$



**Figure 6. CW Performance Small Signal Gain & Input Return Loss**

$V_{DD} = 48 \text{ V}$ ,  $I_{DQ(MAIN)} = 800 \text{ mA}$

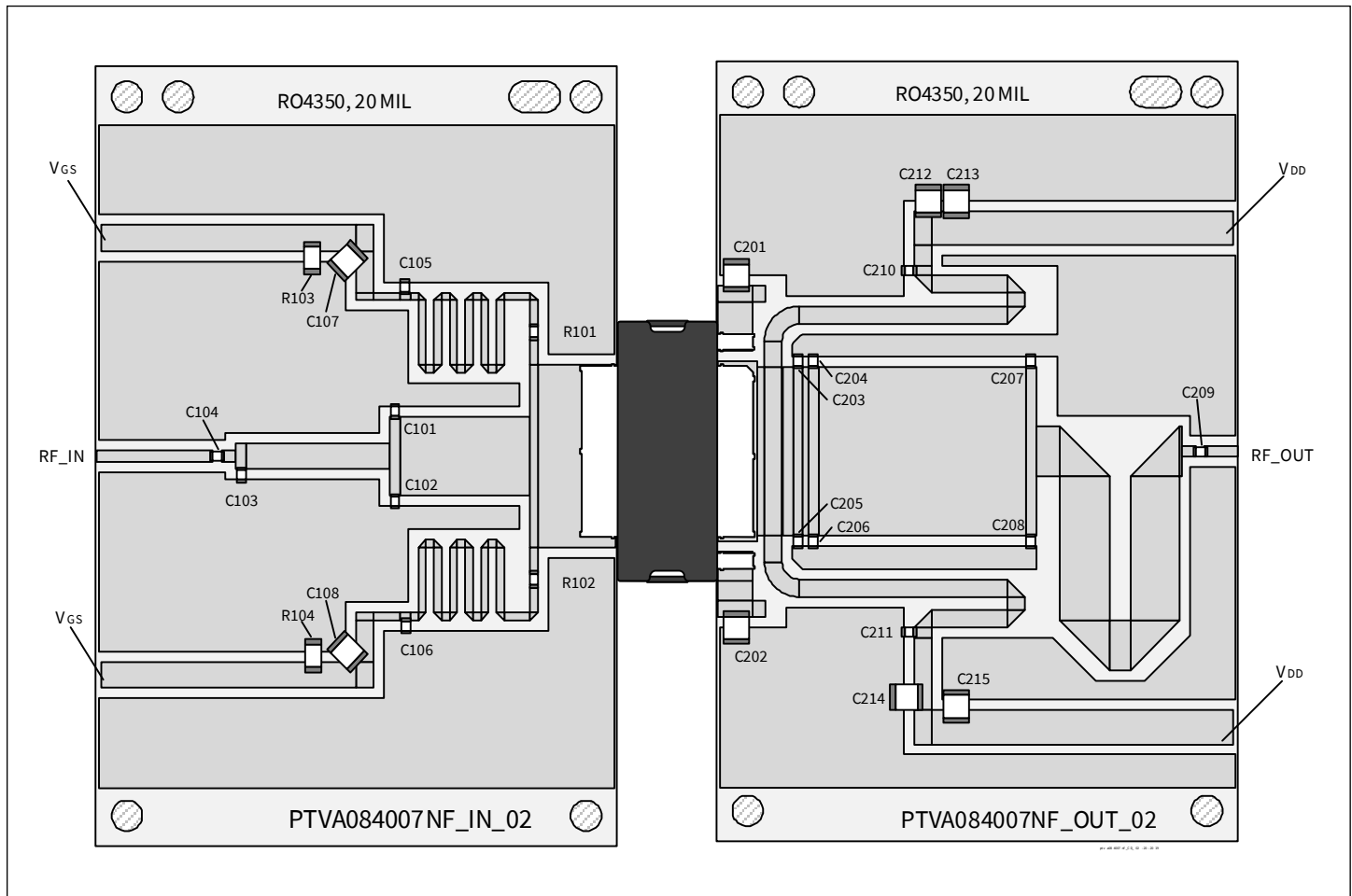
**Load Pull Performance**

**Load Pull Performance** – Pulsed CW signal: 160  $\mu\text{s}$ , 10% duty cycle, 48 V,  $I_{DQ} = 700 \text{ mA}$

		$P_{1dB}$									
		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]	$P_{1dB} [\text{dBm}]$	$P_{1dB} [\text{W}]$	$\eta_D [\%]$
758	1.97-j3.32	1.12-j0.53	21.7	57.00	501.2	58.6	2.02+j0.87	23.4	54.6	287.7	73.2
780	2.23-j3.76	1.09-j0.43	22.0	56.80	478.6	58.3	1.87+j0.89	23.8	54.5	281.2	72.0
803	3.01-j3.64	1.00-j0.42	22.0	56.78	476.4	57.6	1.83+j0.70	23.8	54.6	286.4	71.7

		$P_{3dB}$									
		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]	$P_{3dB} [\text{dBm}]$	$P_{3dB} [\text{W}]$	$\eta_D [\%]$
758	1.97-j3.32	1.14-j0.59	19.8	57.75	595.7	61.9	2.00+j0.40	21.3	55.9	388.2	73.8
780	2.23-j3.76	1.09-j0.46	20.0	57.56	570.2	60.9	1.96+j0.43	21.7	55.8	377.6	72.5
803	3.01-j3.64	1.03-j0.49	20.0	57.52	564.9	60.2	1.73+j0.62	21.7	55.3	338.1	72.0

## Evaluation Board, 758 – 803 MHz



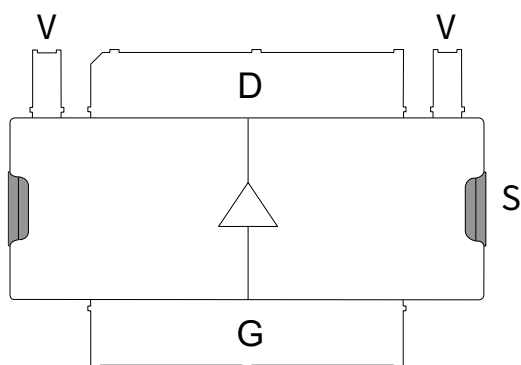
Reference circuit assembly diagram (not to scale)

Evaluation Board Part No.	LTN/PTVA084007NF-V1
PCB Information	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ , $f = 758 - 803$ MHz

## Components Information

Component	Description	Manufacturer	P/N
<b>Input</b>			
C101, C103	Capacitor, 3.3 pF	ATC	ATC600F3R3CW250T
C102	Capacitor, 4.7 pF	ATC	ATC600F4R7CW250T
C104, C105, C106	Capacitor, 51 pF	ATC	ATC600F510JW250T
C107, C108	Capacitor, 10 $\mu$ F	Taiyo Yuden	UMK325C7106MM-T
R101, R102	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-3GEYJ100V
R103, R104	Resistor, 1000 ohms	Panasonic Electronic Components	ERJ-8GEYJ102V
<b>Output</b>			
C201, C202, C212, C213, C214, C215	Capacitor, 10 $\mu$ F, 100 V	TDK Corporation	C5750X7S2A106M230KB
C203, C204, C205, C206	Capacitor, 8.2 pF	ATC	ATC600F8R2CW250T
C207, C208	Capacitor, 3.0 pF	ATC	ATC600F3R0CW250T
C209, C210, C211	Capacitor, 51 pF	ATC	ATC600F510JW250T

## Pinout Diagram (top view)



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



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

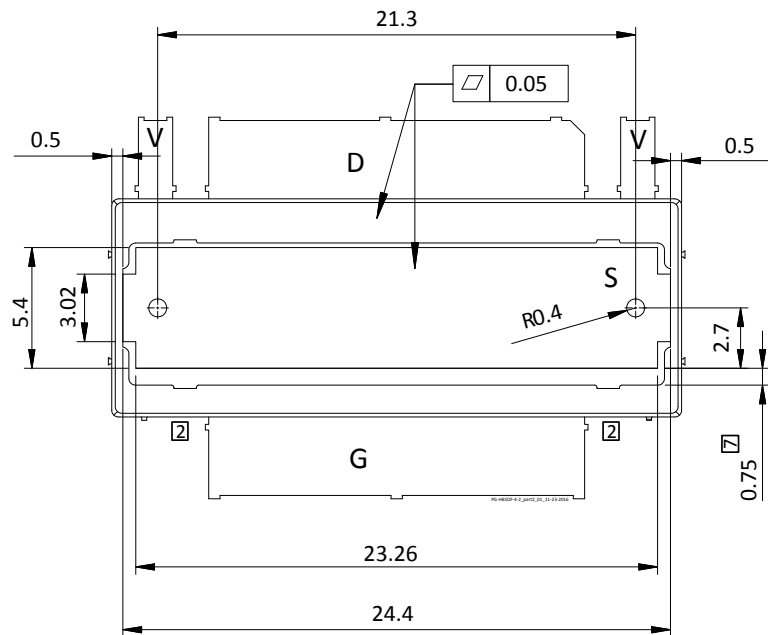


Diagram Notes – unless otherwise specified:

1. Modem/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. Dose not include mold/dam bar/metal protrusion.
7. Exposed metal surface is tin-plated, may not be covered by mold compound.
8. All toleranceds  $\pm 0.1$  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.