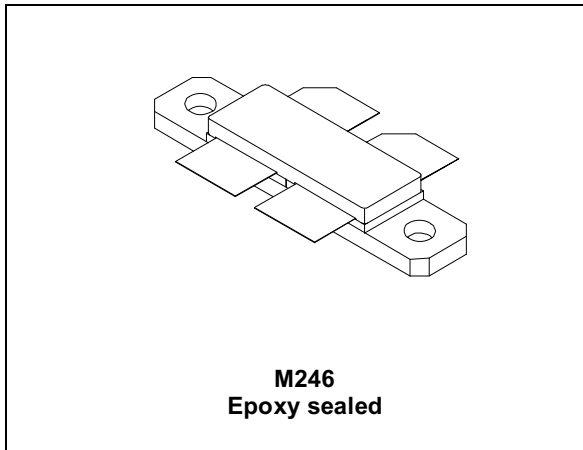


## RF power transistor from the LdmoST family of N-channel enhancement-mode lateral MOSFETs

Datasheet - target specification



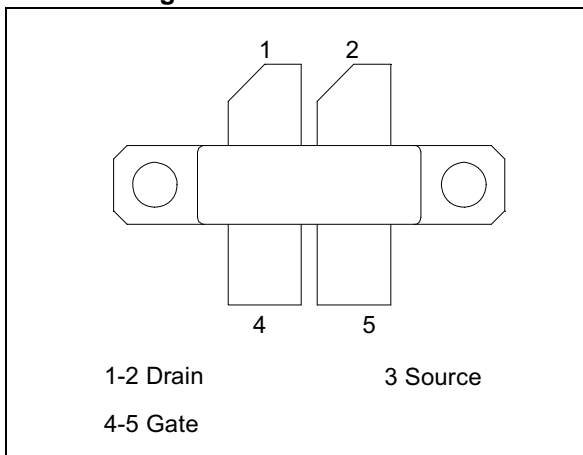
### Features

- Excellent thermal stability
- Common source configuration Push-pull
- $P_{OUT} = 60\text{ W}$  with 16 dB gain @ 860 MHz
- BeO-free package

### Description

The device is a common source N-channel enhancement-mode lateral field-effect RF power transistor designed for broadband commercial and industrial applications at frequencies up to 1 GHz. It is designed for high gain and broadband performance operating in common source mode at 28 V. It is ideal for applications from 1 to 1000 MHz.

**Figure 1. Pin connections**



**Table 1. Device summary**

Order code	Package	Branding
SD56060	M246	SD56060

# Contents

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# 1 Electrical data

## 1.1 Maximum ratings

Table 2. Absolute maximum ratings ( $T_{CASE} = 25\text{ °C}$ )

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-source voltage	65	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current	8	A
$P_{DISS}$	Power dissipation (@ $T_c = 70\text{ °C}$ )	148	W
$T_J$	Max. operating junction temperature	200	$^{\circ}\text{C}$
$T_{STG}$	Storage temperature	-65 to +150	$^{\circ}\text{C}$

## 1.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thJC}$	Junction - case thermal resistance	0.875	$^{\circ}\text{C/W}$

## 2 Electrical characteristics

$$T_{\text{CASE}} = +25\text{ }^{\circ}\text{C}$$

### 2.1 Static

Table 4. Static (per section)

Symbol	Test conditions		Min	Typ	Max	Unit
$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{ V}$	$I_{\text{DS}} = 1\text{ mA}$	65			V
$I_{\text{DSS}}$	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 28\text{ V}$			1	$\mu\text{A}$
$I_{\text{GSS}}$	$V_{\text{GS}} = 20\text{ V}$	$V_{\text{DS}} = 0\text{ V}$			1	$\mu\text{A}$
$V_{\text{GS(Q)}}$	$V_{\text{DS}} = 28\text{ V}$	$I_{\text{D}} = 100\text{ mA}$	3.0		5.0	V
$V_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{ V}$	$I_{\text{D}} = 3\text{ A}$		1.3		V
$G_{\text{FS}}$	$V_{\text{DS}} = 10\text{ V}$	$I_{\text{D}} = 3\text{ A}$		1.8		mho
$C_{\text{ISS}}$	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 28\text{ V}$		58		pF
$C_{\text{OSS}}$	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 28\text{ V}$		34		pF
$C_{\text{RSS}}$	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 28\text{ V}$		2.7		pF

Note: REF. 7194566A

### 2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions		Min	Typ	Max	Unit
$P_{\text{OUT}}$	$V_{\text{DD}} = 28\text{ V}$	$I_{\text{DQ}} = 100\text{ mA}$ $f = 860\text{ MHz}$	60			W
$G_{\text{PS}}$	$V_{\text{DD}} = 28\text{ V}$	$I_{\text{DQ}} = 100\text{ mA}$ $P_{\text{OUT}} = 60\text{ W}$ $f = 860\text{ MHz}$	14	16		dB
$\eta_{\text{D}}$	$V_{\text{DD}} = 28\text{ V}$	$I_{\text{DQ}} = 100\text{ mA}$ $P_{\text{OUT}} = 60\text{ W}$ $f = 860\text{ MHz}$	50	60		%
IMD (1)	$V_{\text{DD}} = 28\text{ V}$	$I_{\text{DQ}} = 100\text{ mA}$ $P_{\text{OUT}} = 60\text{ W PEP}$		-28		dB <sub>C</sub>
Load mismatch	$V_{\text{DD}} = 28\text{ V}$	$I_{\text{DQ}} = 100\text{ mA}$ $P_{\text{OUT}} = 60\text{ W}$ $f = 860\text{ MHz}$ All phase angles	5:1			VSWR

Note: 1 PEP  $f_1 = 860\text{ MHz}$ ,  $f_2 = 860.1\text{ MHz}$

### 3 Impedances

Figure 2. Current conventions

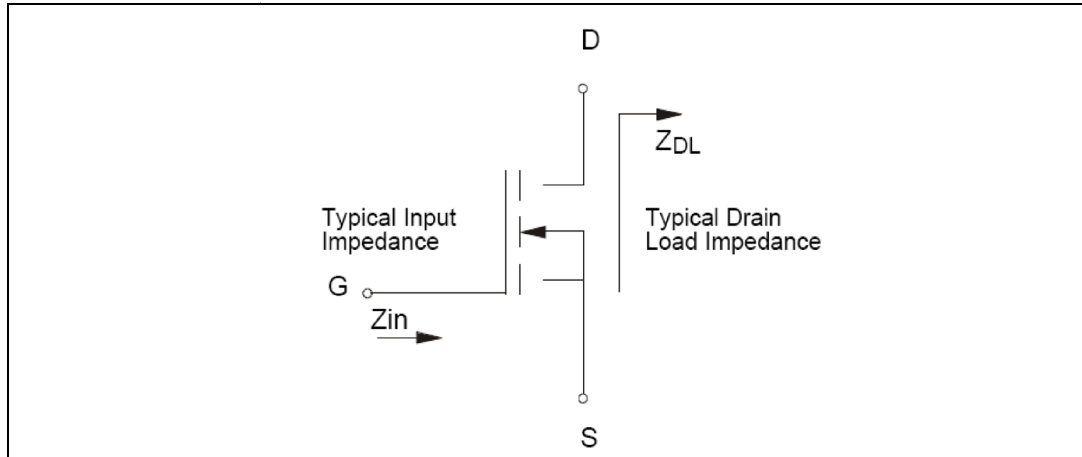
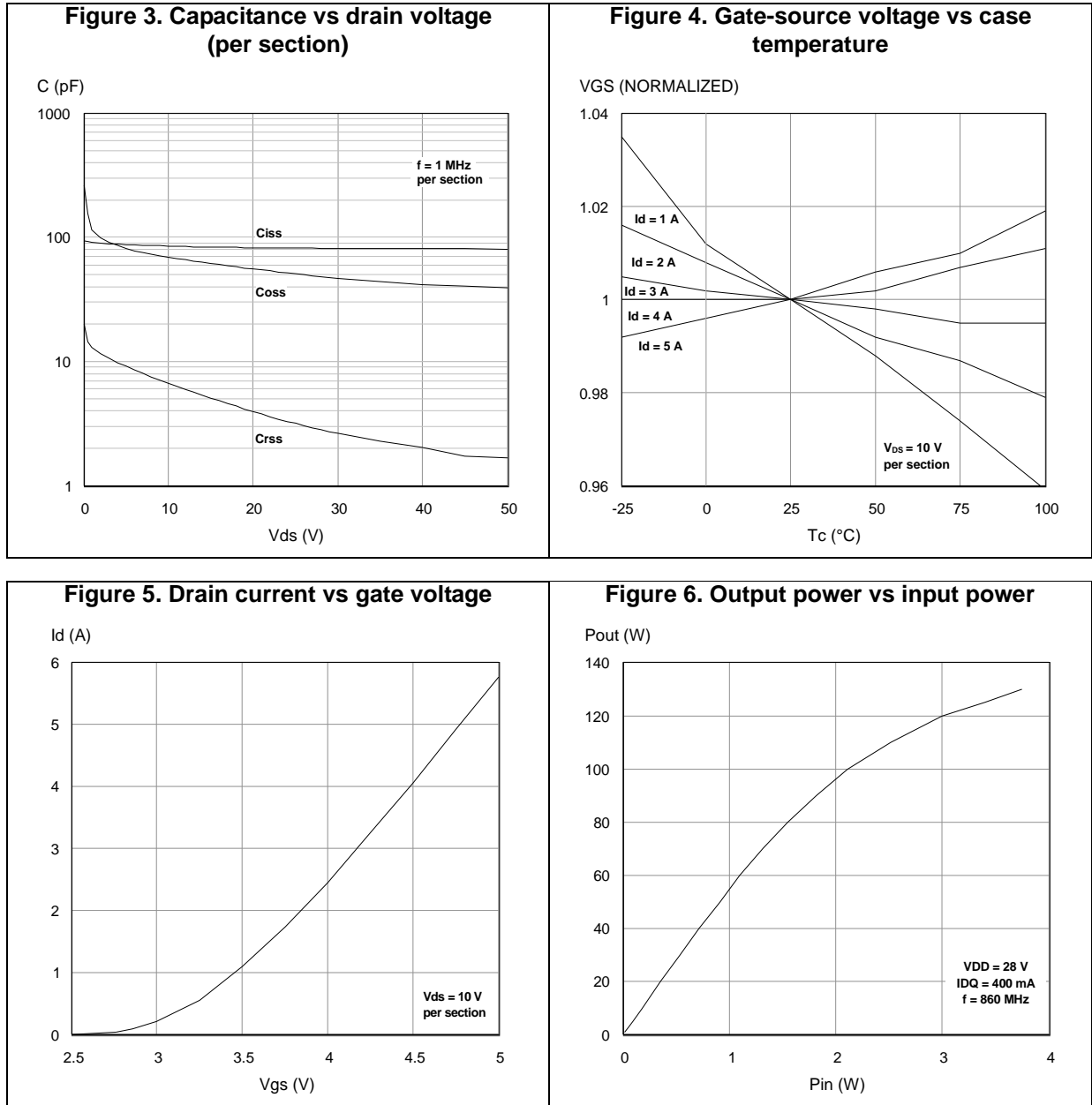


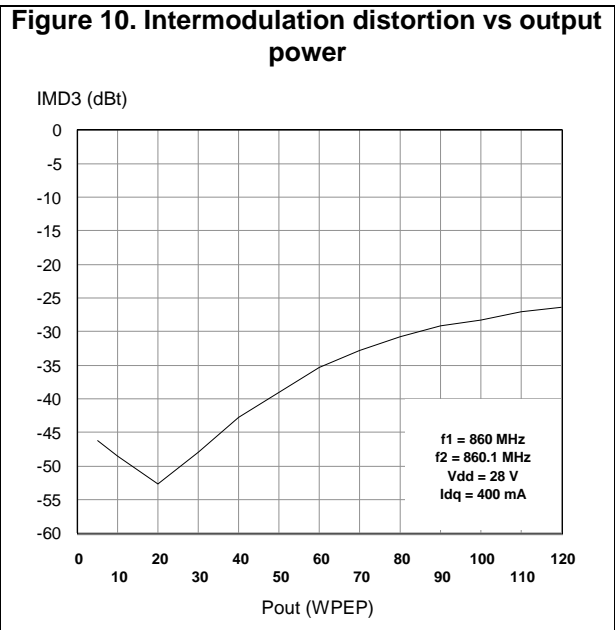
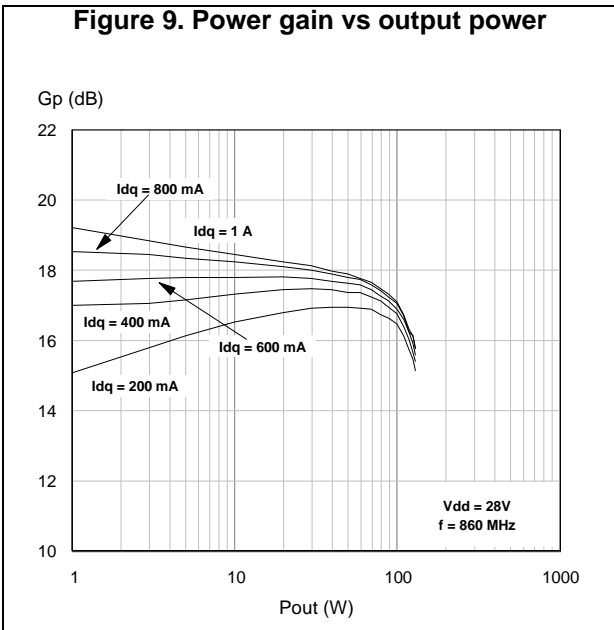
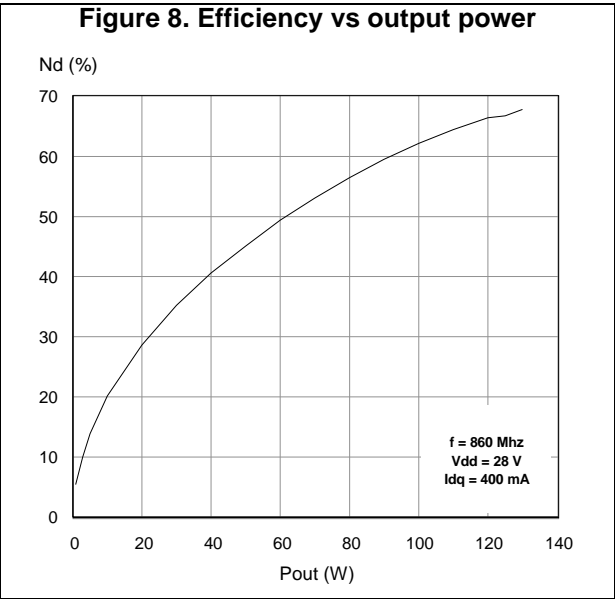
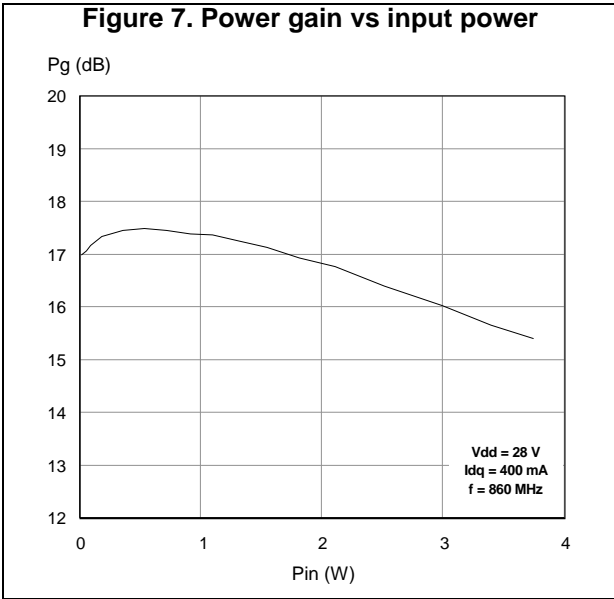
Table 6. Impedance data

Freq. (MHz)	$Z_{IN}$ ( $\Omega$ )	$Z_{DL}$ ( $\Omega$ )
860 MHz	TBD	TBD

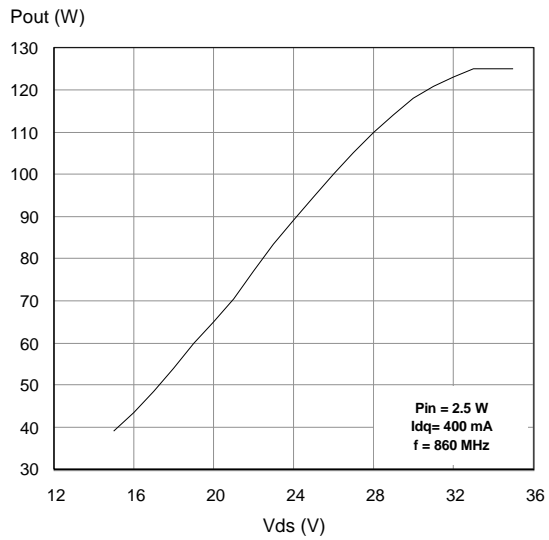
Measured drain to drain and gate to gate respectively.

# 4 Typical performances

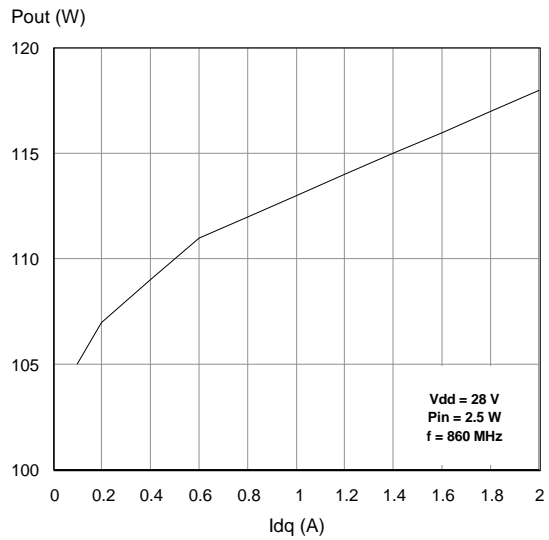




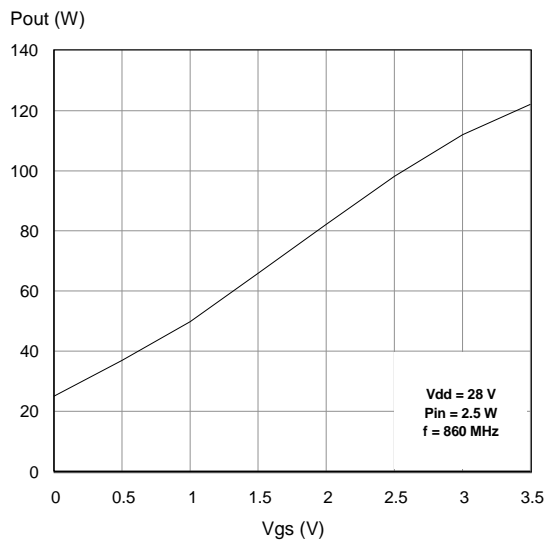
**Figure 11. Output power vs drain voltage**



**Figure 12. Output power vs bias current**



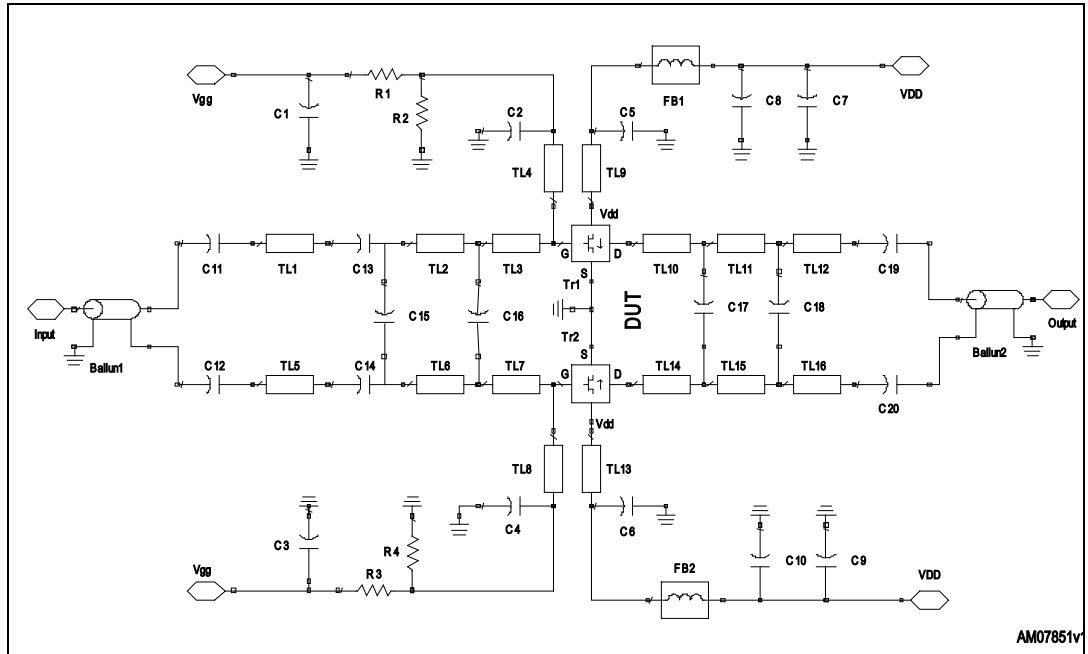
**Figure 13. Output power vs gate-source voltage**





# 5 Test circuits

Figure 14. 860 MHz test circuit schematic



- Note:
- 1 Dimensions at component symbols are reference for component placement.
  - 2 Gap between ground & transmission line = 0.056 [1.42] +0.002 [0.05] -0.000 [0.00] typ.

Table 7. Circuit component list

Item	Q.ty	Part number	Vendor	Description
R1, R3	2	CR1206-8W-130JB	VENKEL	13 Ω, 1/8 W surface mount chip resistor
R2, R4	2	CR1206-8W-122JB	VENKEL	1.2 kΩ, 1/8 W surface mount chip resistor
R5, R6	2	CR1206-8W-250JB	VENKEL	25 Ω, 1/8 W surface mount chip resistor
B1, B2	2	2743021447	FAIR-RITE CORP	Surface mount EMI shield bead
C1, C3, C7, C9	4			100 μF, 63 V electrolytic capacitor
C2, C4, C5, C6	4	ATC100B910XXXX	ATC	91 pF chip capacitor
C8, C10	2	C1812X7R501-104KNE	VENKEL	0.1 F 500 V surface mount ceramic chip capacitor
C11, C12	2	ATC100B620XXXX	ATC	62 pF chip capacitor
C13, C14	2	ATC100B151XXXX	ATC	150 pF chip capacitor
C15	1	ATC100B110XXXX	ATC	5.1 pF chip capacitor
C16	1	ATC100B7R5XXXX	ATC	7.5 pF chip capacitor
C17	1	ATC100B1R1XXXX	ATC	1.1 pF chip capacitor

Table 7. Circuit component list (continued)

Item	Q.ty	Part number	Vendor	Description
C18	1	27291PC	JOHANSON	0.8 - 8 pF giga trim variable capacitor
C19, C20	2	ATC100B101XXXX	ATC	100 pF chip capacitor
TL1, TL5				L= 0.250in [6.35mm] W=0.214in [5.44mm]
TL2, TL6				L= 0.182in [4.62mm] W=0.284in [7.21mm]
TL3, TL7				L= 0.318in [8.08mm] W=0.284in [7.21mm]
TL4, TL8, TL9, TL13				L= 2.37in [60.19mm] W=0.082in [2.08mm]
TL10, TL14				L= 0.314in [7.97mm] W=0.230in [5.84mm]
TL11, TL15				L= 0.460in [11.68mm] W=0.230in [5.84mm]
TL12, TL16				L= 0.280in [7.11mm] W=0.230in [5.84mm]
Board 3X5	1		Rogers Corp	Er=2.55 t=0.0026in h=0.030in

## 6 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**Figure 15. M246 (.230 x .650 WIDE 4/L BAL N/HERM W/FLG) package outline**

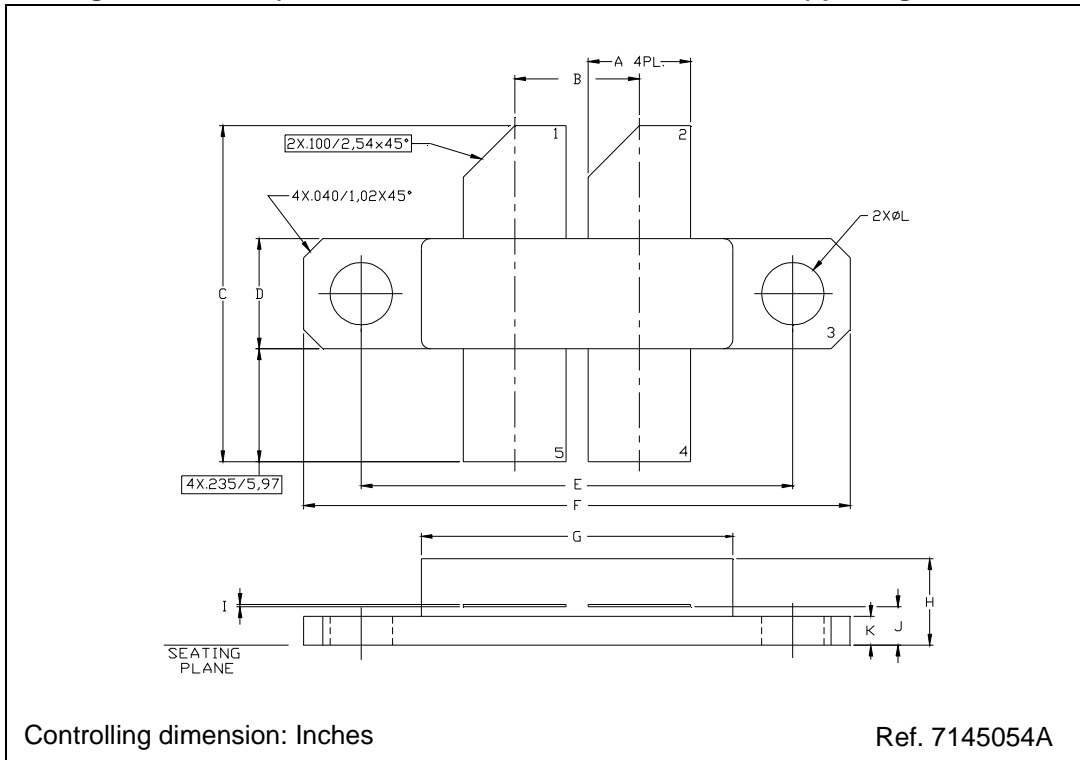


Table 8. M246 (.230 x .650 WIDE 4/L BAL N/HERM W/FLG) package mechanical data

Dim.	mm.			Inch		
	Min	Typ	Max	Min	Typ	Max
A	5.33		5.59	.210		.220
B	6.48		6.73	.255		.265
C	17.27		18.29	.680		.720
D	5.72		5.97	.225		.235
E		22.86			.900	
F	28.83		29.08	1.135		1.145
G	16.26		16.76	.640		.660
H	4.19		5.08	.165		.200
I	0.08		0.15	.003		.006
J	1.83		2.24	.072		.088
K	1.40		1.65	.055		.065
L	3.18		3.43	.125		.135

## 7 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
15-Jun-2015	1	Initial release