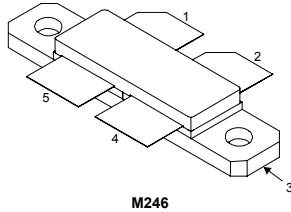


## 60 W, 28 V, HF to 1 GHz RF power LDMOS transistor



## Features

Order code	Frequency	V <sub>DD</sub>	P <sub>OUT</sub>	Gain	Efficiency
SD56060	860 MHz	28 V	60 W	16 dB	60

- Excellent thermal stability
- Common source configuration push-pull
- BeO-free package

## Applications

- Ground/air communication
- ISM

## Description

The **SD56060** 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.

Pin connection	
Pin	Connection
1	Drain A
2	Drain B
3	Source (bottom side)
4	Gate B
5	Gate A



Product status link	
<a href="#">SD56060</a>	

Product summary	
Order code	SD56060
Marking	SD56060
Package	M246
Packing	Box
Base/bulk quantity	20/60

## 1 Electrical ratings

**Table 1. Absolute maximum ratings ( $T_C = 25\text{ °C}$ )**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	65	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current	8	A
$P_{TOT}$	Total power dissipation at $T_C = 70\text{ °C}$	148	W
$T_{STG}$	Storage temperature range	-65 to 150	$^{\circ}\text{C}$
$T_J$	Maximum junction temperature	200	$^{\circ}\text{C}$

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJC}$	Thermal resistance, junction-to-case	0.875	$^{\circ}\text{C}/\text{W}$

## 2 Electrical characteristics

$T_C = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 3. Static (per side)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	65			V
$I_{DSS}$	Zero gate voltage drain leakage current	$V_{GS} = 0\text{ V}, V_{DS} = 28\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate-source leakage current	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			1	$\mu\text{A}$
$V_{GS(Q)}$	Gate quiescent voltage	$V_{DS} = 28\text{ V}, I_D = 100\text{ mA}$	2.8		5.0	V
$V_{DS(on)}$	Static drain-source on-voltage	$V_{GS} = 10\text{ V}, I_D = 3\text{ A}$		1.3		V
$G_{FS}$	Transconductance	$V_{DS} = 10\text{ V}, I_D = 3\text{ A}$		1.8		S
$C_{iss}$	Common source input capacitance	$V_{GS} = 0\text{ V}, V_{DD} = 28\text{ V}, f = 1\text{ MHz}$		58		pF
$C_{rss}$	Common source feedback capacitance			34		pF
$C_{oss}$	Common source output capacitance			2.7		pF

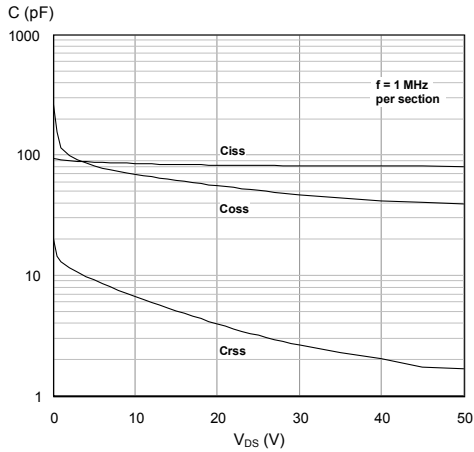
**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$P_{OUT}$	Output power	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA}, f = 860\text{ MHz}$	60		-	W
$G_{PS}$	Power gain	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA},$	14	16	-	dB
$\eta_D$	Drain efficiency	$P_{OUT} = 60\text{ W}, f = 860\text{ MHz}$	50	60	-	%
IMD	Intermodulation distortion	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA},$ $P_{OUT} = 60\text{ W}, \text{PEP}^{(1)}$		-28	-	dB <sub>C</sub>
VSWR	Load mismatch	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA},$ $P_{OUT} = 60\text{ W}, f = 860\text{ MHz}, \text{all phases}$	5:1		-	

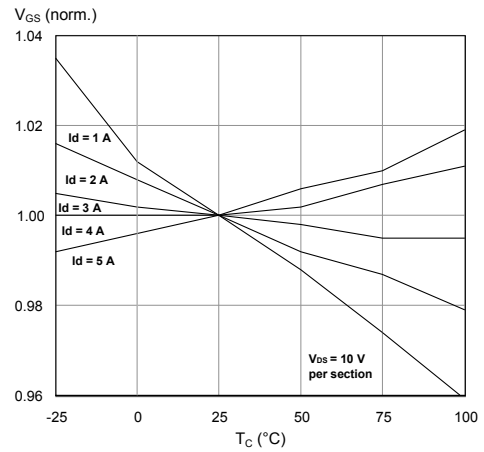
1. PEP is:  $f_1 = 860\text{ MHz}$  and  $f_2 = 860.1\text{ MHz}$ .

### 3 Typical performances

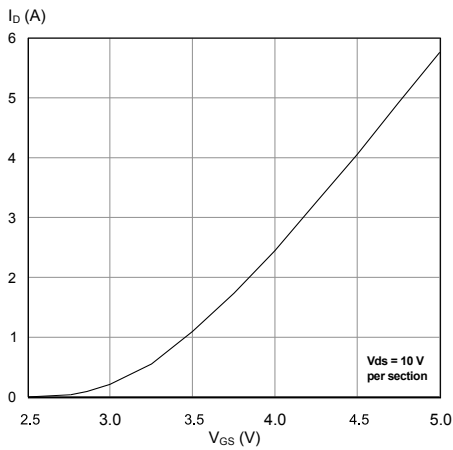
**Figure 1. Capacitance vs drain voltage (per section)**



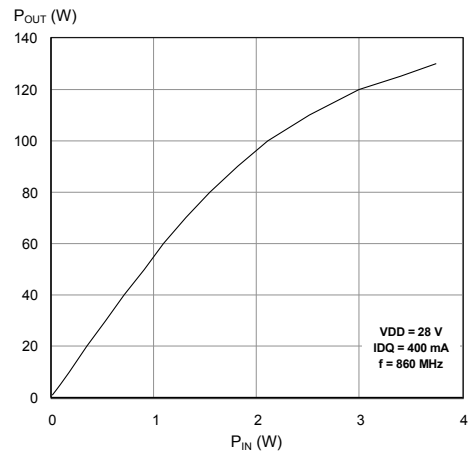
**Figure 2. Gate-source voltage vs case temperature**



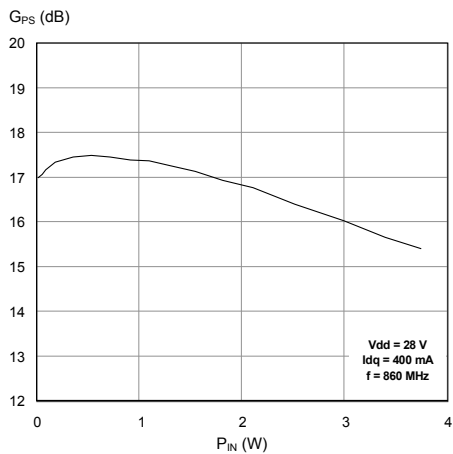
**Figure 3. Drain current vs gate voltage**



**Figure 4. Output power vs input power**



**Figure 5. Power gain vs input power**



**Figure 6. Efficiency vs output power**

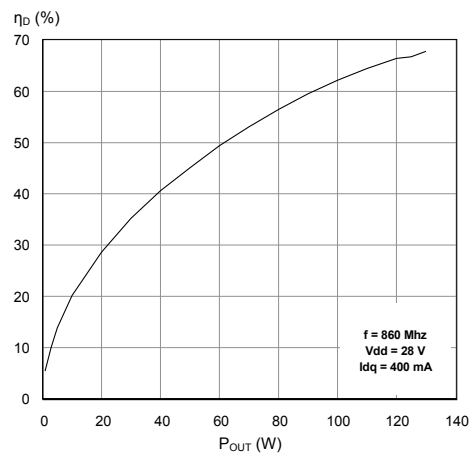


Figure 7. Power gain vs output power

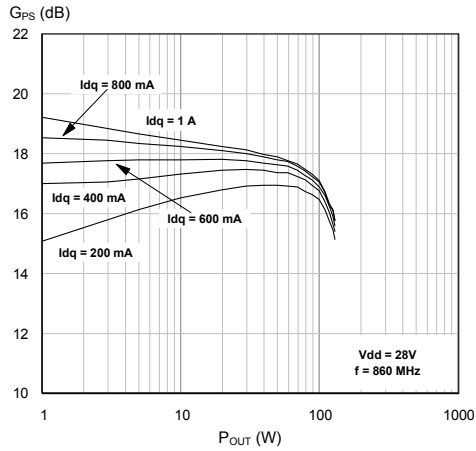


Figure 8. Intermodulation distortion vs output power

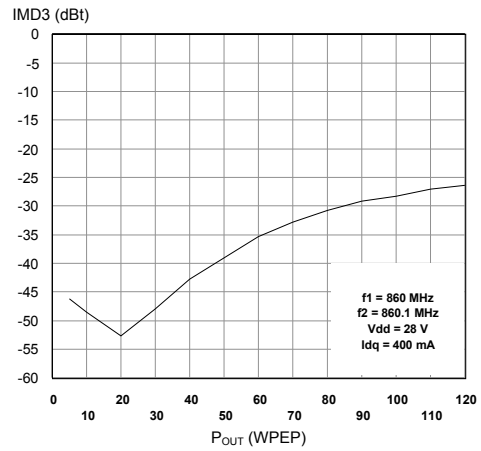


Figure 9. Output power vs drain voltage

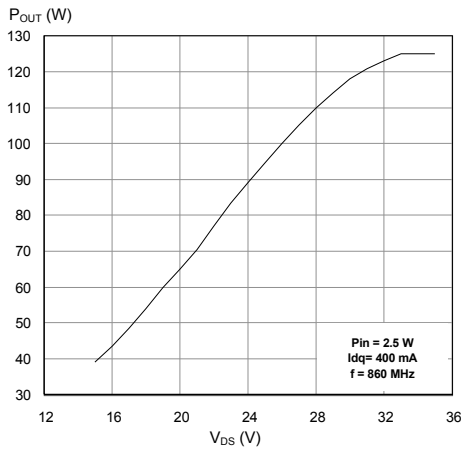


Figure 10. Output power vs bias current

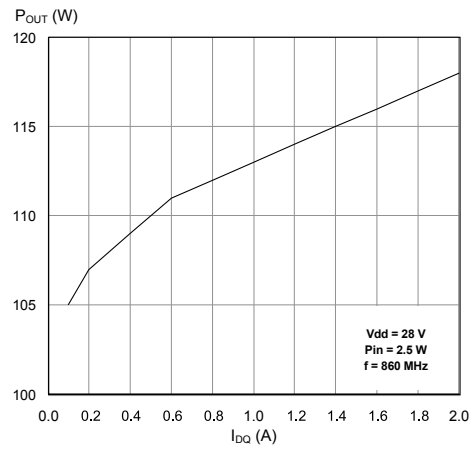
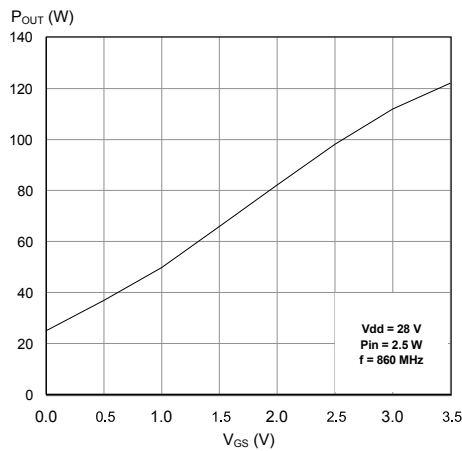
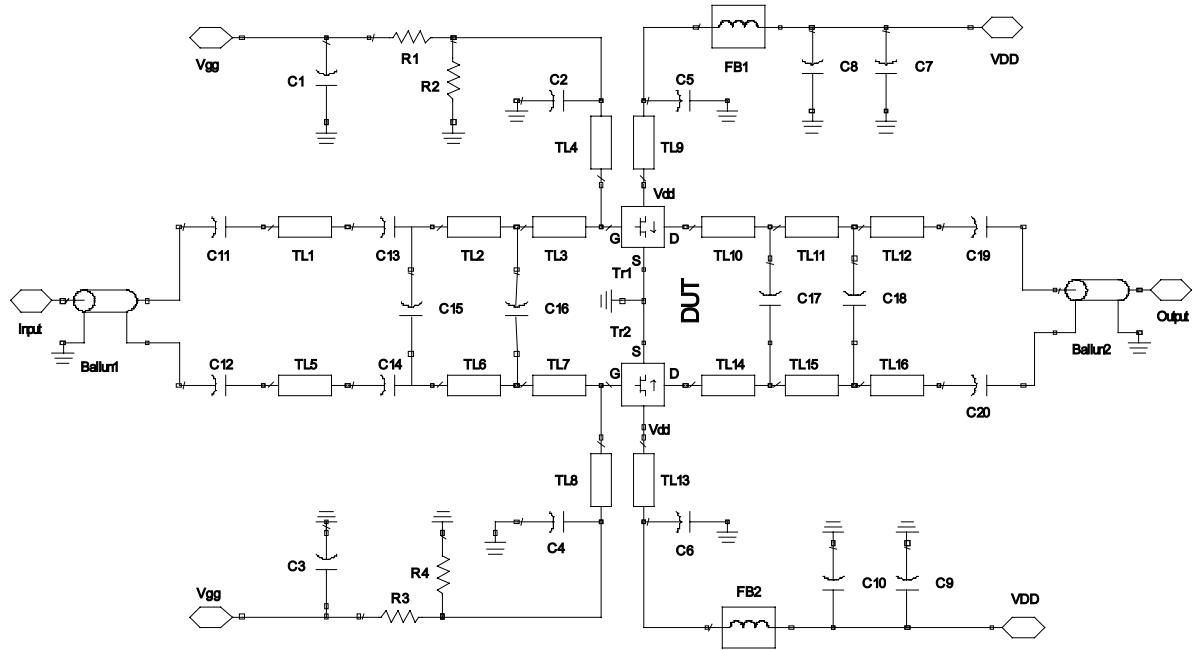


Figure 11. Output power vs gate-source voltage



## 4 Test circuits

Figure 12. Test circuit schematic (f = 860 MHz)



AM07851v1

Note:

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

**Table 5. Components list**

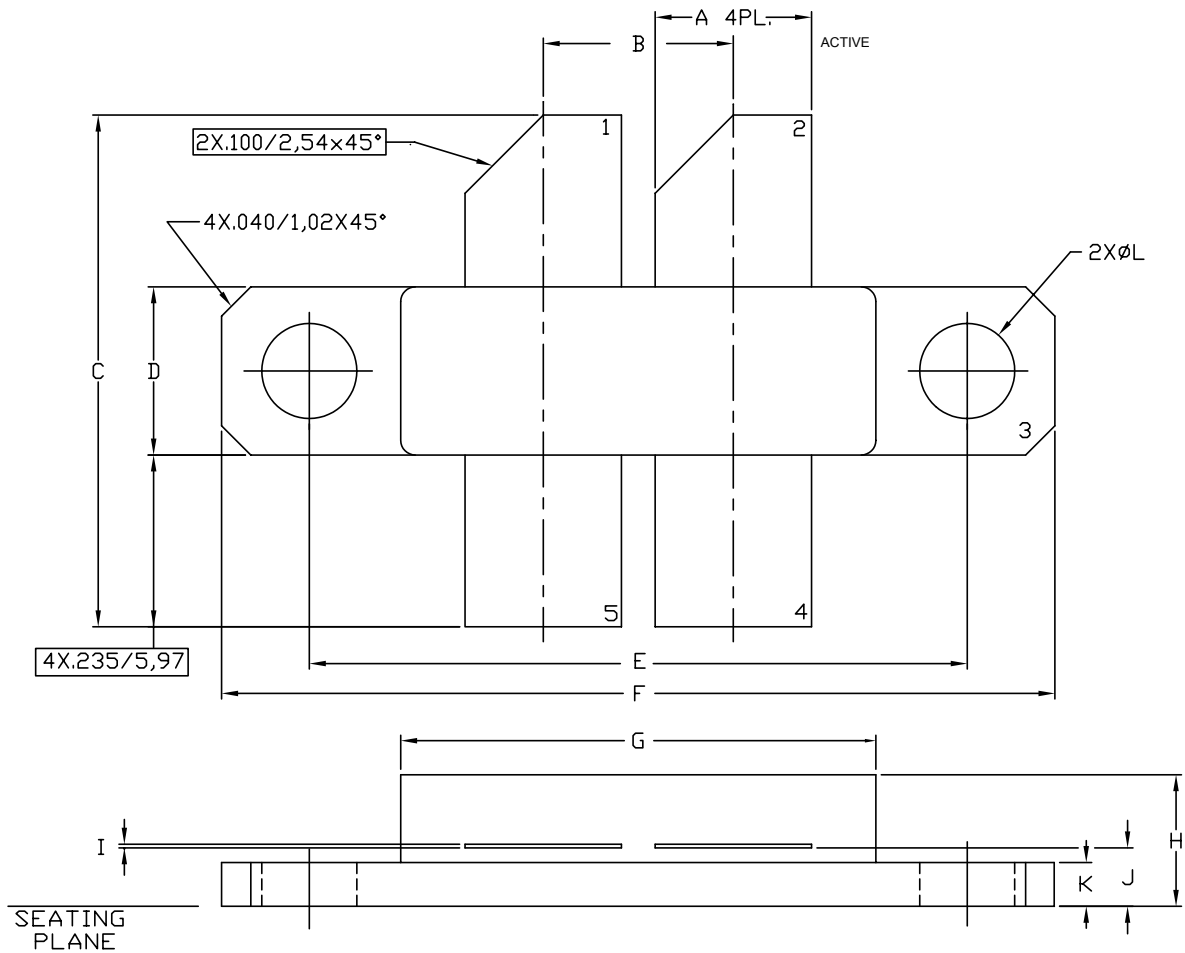
Component	Q.ty	Part number	Vendor	Description
R1, R3	2	CR1206-8W-130JB	VENKEL	13 $\Omega$ , 1/8 W surface mount chip resistor
R2, R4	2	CR1206-8W-122JB	VENKEL	1.2 k $\Omega$ , 1/8 W surface mount chip resistor
R5, R6	2	CR1206-8W-250JB	VENKEL	25 $\Omega$ , 1/8 W surface mount chip resistor
B1, B2	2	2743021447	FAIR-RITE CORP	Surface mount EMI shield bead
C1, C3, C7, C9	4			100 $\mu$ F, 63 V electrolytic capacitor
C2, C4, C5, C6	4	ATC100B910XXXX	ATC	91 pF chip capacitor
C8, C10	2	C1812X7R501-104KNE		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
C18	1	27291PC	JOHANSON	0.8-8 pF giga trim variable capacitor
C19, C20	2	ATC100B101XXXX	ATC	100 pF chip capacitor
TL1, TL5				L= 0.250 in [6.35 mm], W=0.214 in [5.44 mm]
TL2, TL6				L= 0.182 in [4.62 mm], W=0.284 in [7.21 mm]
TL3, TL7				L= 0.318 in [8.08 mm], W=0.284 in [7.21 mm]
TL4, TL8, TL9, TL13				L= 2.37 in [60.19 mm], W=0.082 in [2.08 mm]
TL10, TL14				L= 0.314 in [7.97 mm], W=0.230 in [5.84 mm]
TL11, TL15				L= 0.460 in [11.68 mm], W=0.230 in [5.84 mm]
TL12, TL16				L= 0.280 in [7.11 mm], W=0.230 in [5.84 mm]
Board 3x5	1		Rogers Corp	$\epsilon_r = 2.55$ , t (copper layer thickness) = 0.0026 in [0.066 mm], h (PCB thickness) = 0.030 in [0.762 mm]

## 5 Package information

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

### 5.1 M246 package information

Figure 13. M246 package outline



7145054\_5

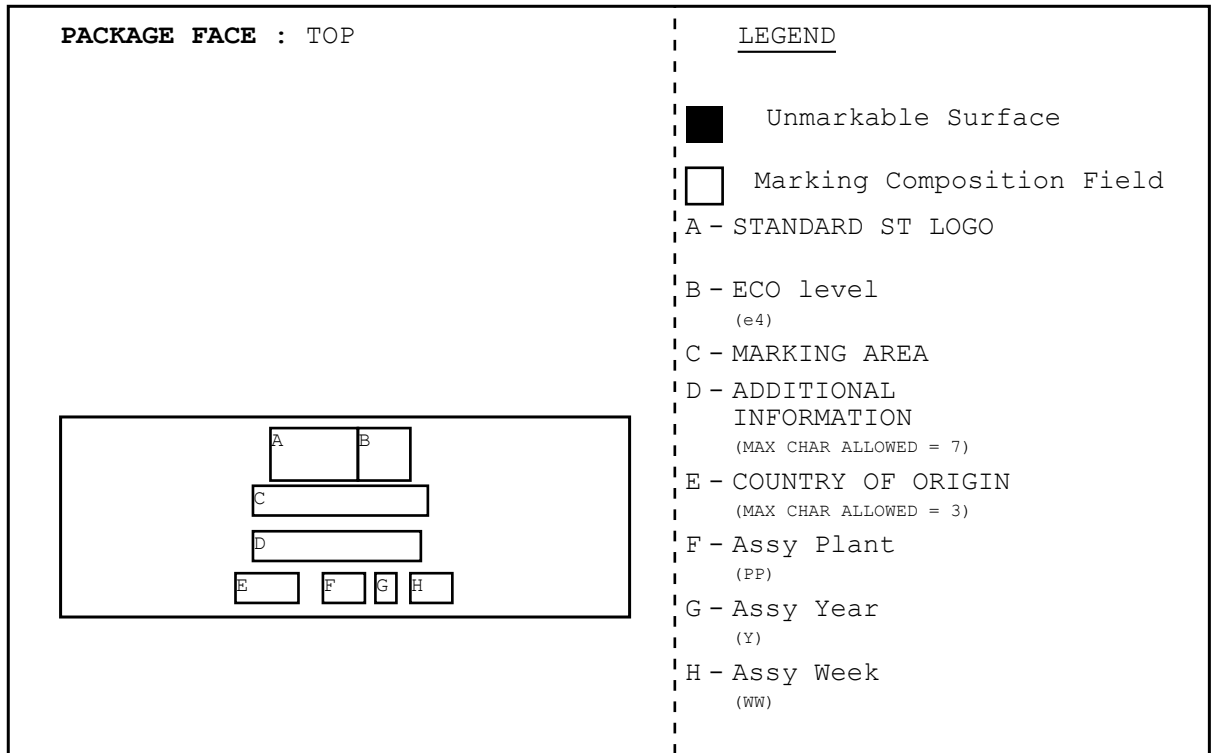


**Table 6. M246 mechanical data**

Symbol	Milimeters		
	Min.	Typ.	Max.
A	5.33		5.59
B	6.48		6.73
C	17.27		18.29
D	5.72		5.97
E		22.86	
F	28.83		29.08
G	16.26		16.76
H	4.19		5.08
I	0.08		0.15
J	1.83		2.24
K	1.40		1.65
L	3.18		3.43

## 5.2 Marking information

Figure 14. Marking composition



GADG040220211644GT

## Revision history

**Table 7. Document revision history**

Date	Version	Changes
15-Jun-2015	1	First release.
22-Dec-2021	2	Updated title, Features, Description, Device summary and added Applications on cover page. Updated Table 3. Static (per side). Removed <i>Impedances</i> chapter. Updated Section 5 Package information and added Section 5.2 Marking information. Minor text changes.

---

## Contents

<b>1</b>	<b>Electrical data</b> .....	<b>2</b>
<b>2</b>	<b>Electrical characteristics</b> .....	<b>3</b>
<b>3</b>	<b>Typical performances</b> .....	<b>4</b>
<b>4</b>	<b>Test circuits</b> .....	<b>6</b>
<b>5</b>	<b>Package information</b> .....	<b>8</b>
<b>5.1</b>	<b>M246 package information</b> .....	<b>8</b>
<b>5.2</b>	<b>Marking information</b> .....	<b>10</b>
	<b>Revision history</b> .....	<b>11</b>

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2021 STMicroelectronics – All rights reserved