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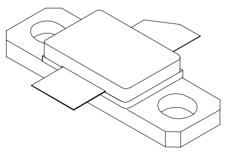
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

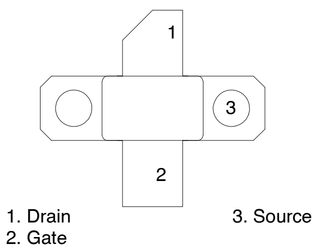
RF power transistor from the LdmoST family of N-channel enhancement-mode lateral MOSFETs

Datasheet - production data



M243
epoxy sealed

Figure 1. Pin out



Features

- Excellent thermal stability
- Common source configuration
- P_{OUT} (@ 28 V)= 70 W with 17 dB gain @ 945 MHz
- BeO free package
- In compliance with the 2002/95/EC European directive
- Bidirectional ESD

Description

The LET9070CB 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 1.0 GHz. The LET9070CB is designed for high gain and broadband performance operating in common source mode at 28 V. It is ideal for base station applications requiring high linearity.

Table 1. Device summary

Order code	Package	Branding
LET9070CB	M243	LET9070CB

This is information on a product in full production. www.st.com

Contents

1 Maximum ratings

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

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-source voltage	80	V
V_{GS}	Gate-source voltage	-10 to +15	V
I_D	Drain current	12	A
P_{DISS}	Power dissipation (@ T_C = 70 °C)	130	W
T_J	Max. operating junction temperature	200	°C
T_{STG}	Storage temperature	-65 to +150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{th(JC)}$	Junction-case thermal resistance	1.0	°C/W

2 Electrical characteristics

(T_C = 25 °C)

Table 4. Static

Symbol	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	V_{GS} = 0; I_{DS} = 10 mA	80			V
I_{DSS}	V_{GS} = 0; V_{DS} = 28 V			1	µA
I_{GSS}	V_{GS} = 5; V_{DS} = 0			1	µA
$V_{GS(Q)}$	V_{DS} = 28; I_D = 100 mA	2.0		5.0	V
$V_{DS(ON)}$	V_{GS} = 10 V; I_D = 3 A		0.8	1.2	V
G_{FS}	V_{DS} = 10 V; I_D = 3 A	2.5			mho
C_{ISS}	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz		78		pF
C_{OSS}	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz		42		pF
C_{RSS}	V_{GS} = 0; V_{DS} = 28 V; f = 1 MHz		2.7		pF

Table 5. Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
P_{OUT}	V_{DD} = 28 V; I_{DQ} = 400 mA; P_{IN} = 2.5 W; f = 945 MHz	70	80		W
G_{PS}	V_{DD} = 28 V; I_{DQ} = 400 mA; P_{OUT} = 70 W; f = 945 MHz		17		dB
h_D	V_{DD} = 28 V; I_{DQ} = 400 mA; P_{IN} = 2.5 W; f = 945 MHz	60	65		%
Load mismatch	V_{DD} = 35 V; I_{DQ} = 400 mA; P_{OUT} = 100 W; f = 945 MHz All phase angles		20:1		VSWR

3 Impedance data

Figure 2. Impedance data

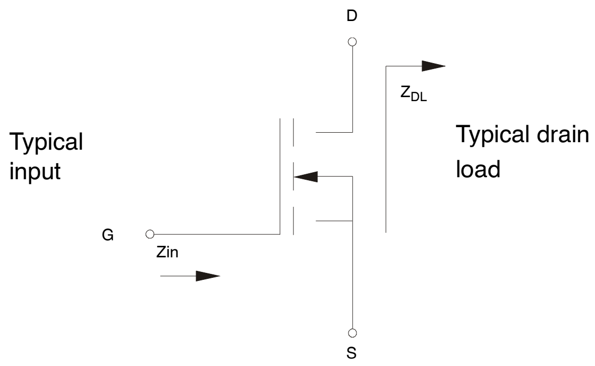


Table 6. Impedance data

Frequency	Z_{IN} (Ω)	Z_{LOAD} (Ω)
100	0.456 -j19.309	3.851 +j0.242
150	0.458 -j12.682	3.791 +j0.353
200	0.464 -j9.320	3.711 +j0.452
250	0.474 -j7.259	3.613 +j0.537
300	0.484 -j5.859	3500 +j0.605
350	0.492 -j4.832	3.376 +j0.655
400	0.500 -j4.038	3.243 +j0.687
450	0.507 -j3.401	3.106 +j0.700
500	0.515 -j2.873	2.966 +j0.697
550	0.525 -j2.423	2.826 +j0.676
600	0.534 -j2.035	2.688 +j0.640
650	0.542 -j1.692	2.553 +j0.591
700	0.549 -j1.394	2.422 +j0.529
750	0.556 -j1.117	2.297 +j0.456
800	0.563 -j0.864	2.178 +j0.373
850	0.570 -j0.629	2.065 +j0.282
900	0.577 -j0.410	1.958 +j0.184
950	0.585 -j0.204	1.857 +j0.079
1000	0.592 -j0.009	1.762 -j0.03
1050	0.613 +j0.172	1.673 -j0.145
1100	0.621 +j0.347	1.590 -j0.264
1150	0.628 +j0.516	1.513 -j0.386

Table 6. Impedance data (continued)

Frequency	Z_{IN} (Ω)	Z_{LOAD} (Ω)
1200	0.633 +j0.680	1.440 -j0.510
1250	0.639 +j0.839	1.373 -j0.637
1300	0.644 +j0.995	1.309 -j0.766
1350	0.648 +j1.148	1.250 -j0.897
1400	0.653 +j1.299	1.195 -j1.030
1450	0.657 +j1.448	1.144 -j1.164
1500	0.660 +j1.597	1.096 -j1.299
1550	0.664 +j1.744	1.051 -j1.436
1600	0.667 +j1.891	1.010 -j1.574
1650	0.670 +j2.038	0.971 -j1.712
1700	0.673 +j2.184	0.934 -j1.852
1750	0.677 +j2.331	0.900 -j1.993
1800	0.680 +j2.478	0.868 -j2.136
1850	0.684 +j2.625	0.838 -j2.279
1900	0.688 +j2.773	0.810 -j2.423
1950	0.692 +j2.921	0.784 -j2.569
2000	0.696 +j3.070	0.759 -j2.716

4 Typical performance

Figure 3. DC output characteristics

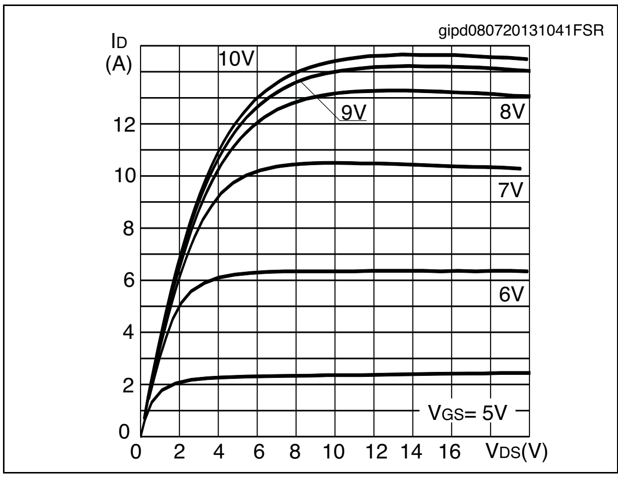


Figure 4. Capacitance variation

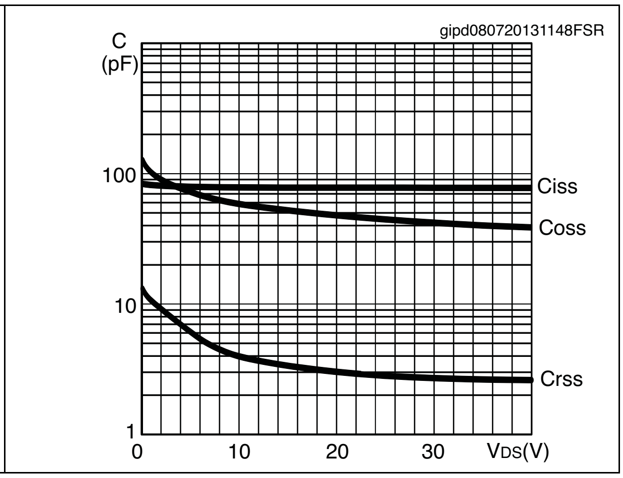


Figure 5. Gain vs output power, freq = 945 MHz, V_{dd} = 28 V

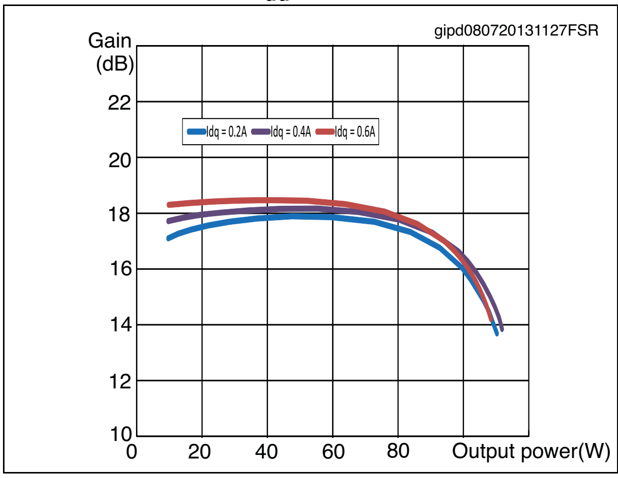


Figure 6. Gain and efficiency vs output power, freq = 945 MHz, V_{dd} = 28 V, I_{dq}= 0.4 A

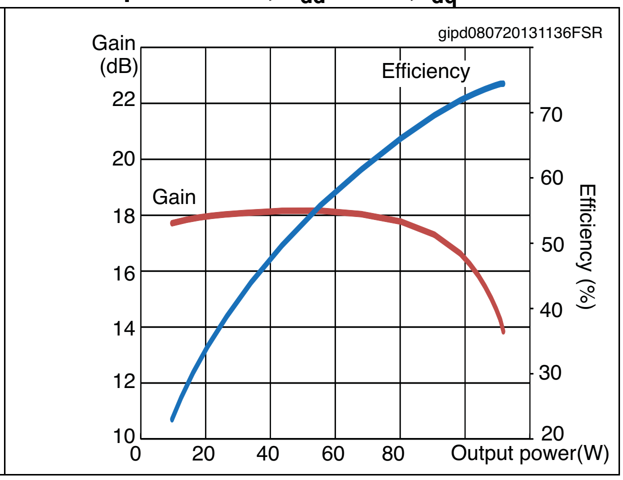


Figure 7. Gain vs output power, freq = 945 MHz, I_{dq} = 0.4 A

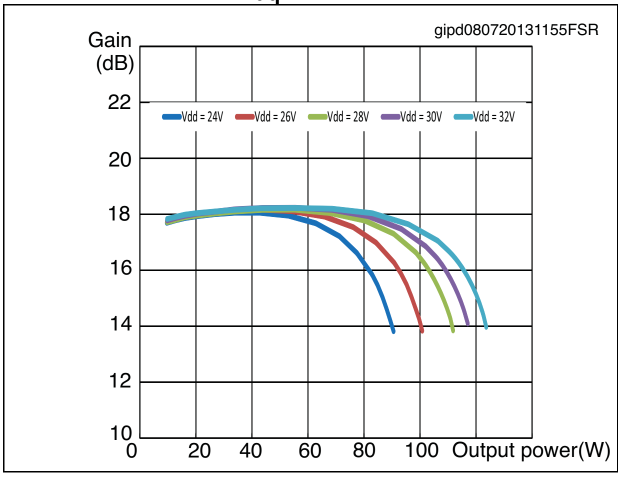


Figure 8. Gain and efficiency vs output power, freq = 945 MHz, V_{dd} = 32 V, I_{dq}= 0.4 A

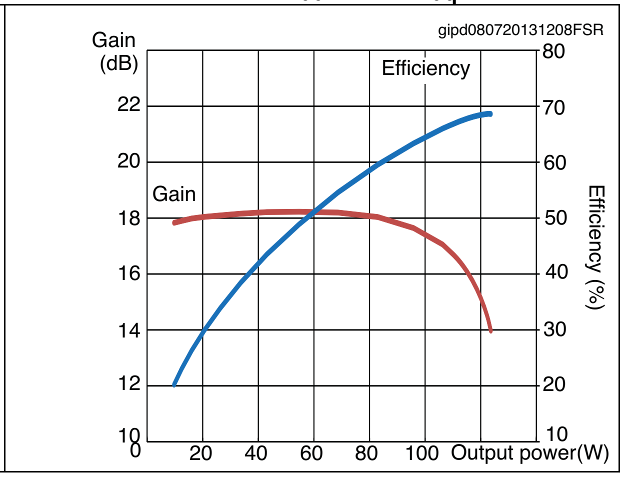
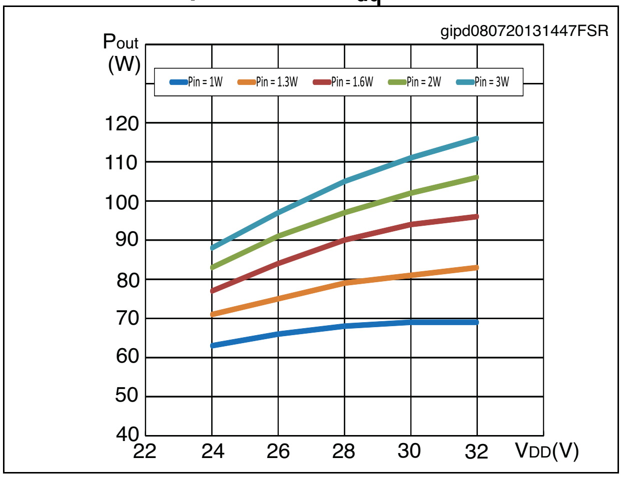


Figure 9. Output power vs supply voltage, freq = 945 MHz, I_{dq} = 0.4 A



5 Test circuit

Figure 10. Test circuit schematic

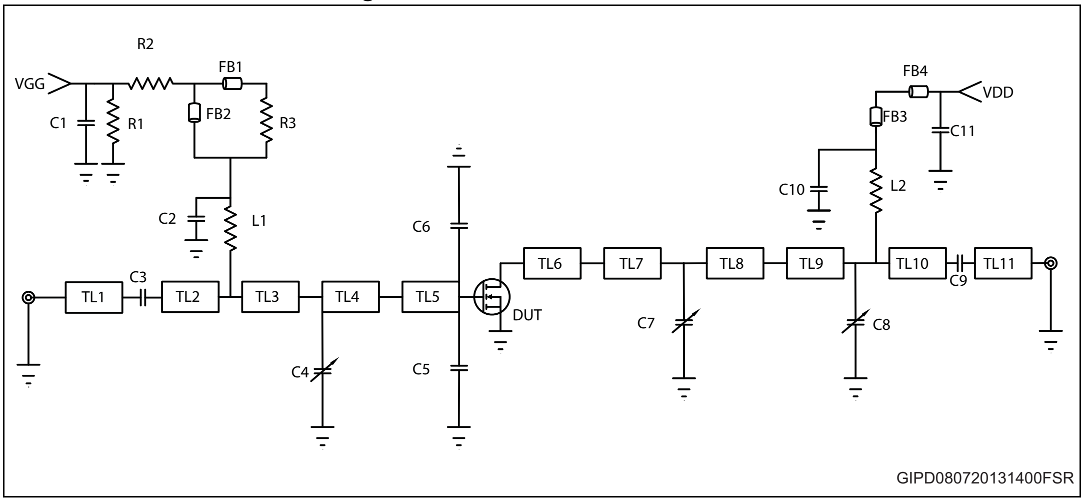


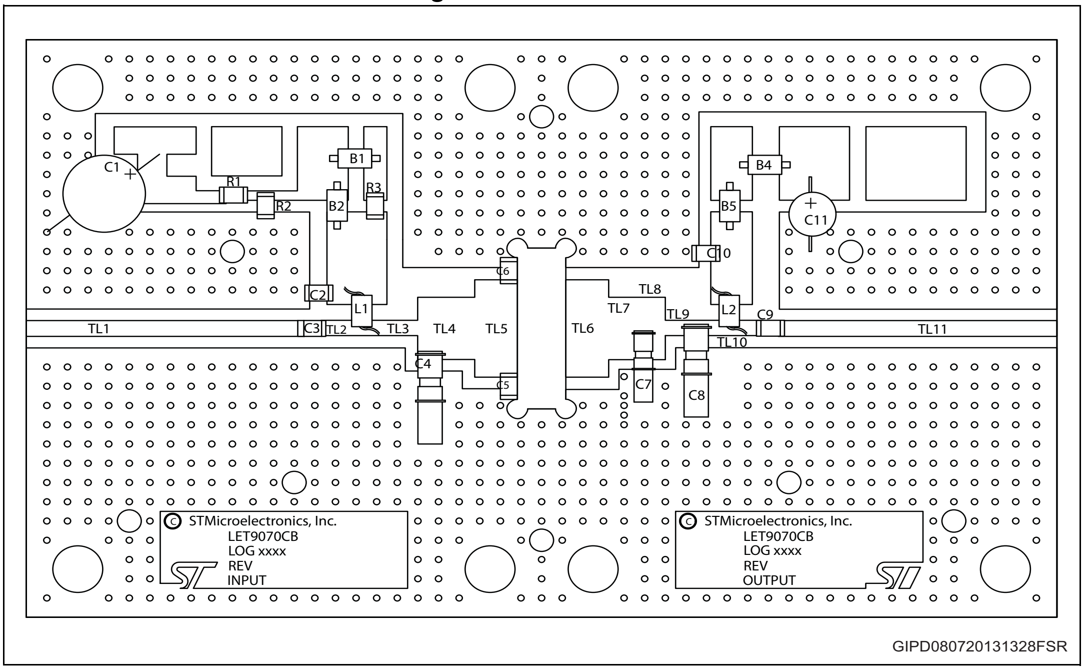
Table 7. Test circuit component part list

Item	Qty	Part number	Vendor	Description
R1, R2	2	CR1206-8W-112JB	VENKEL	1.5 K OHM, 1/8W surface mount chip resistor
R3	1	CR1206-8W-100JB	VENKEL	0 OHM, 1/8W surface mount chip resistor
Coil (L1&L2)	2	1812SMS-33NJ	Coilcraft	33 nH coil
B1,B2,B3,B4	5	2743021447	FAIR-RITE CORP	Surface Mount EMI Sheild Bead
C1	1			100uF, 63V Electrolytic Capacitor
C2, C3, C9, C10	4	ATC100B470	ATC	47 pF Chip Capacitor
C4, C8	2		JOHANSON	0.8-8pF Giga Trim Variable Capacitor
C5	1	ATC100B3R6	ATC	3.6pF Chip Capacitor
C6	1	ATC100B100	ATC	10pF Chip Capacitor
C7	1		JOHANSON	0.6-4.5pF Giga Trim Variable Capacitor
C11	1			330μF, 50V Electrolytic Capacitor
TL1				L= 1.350in W=0.082in
TL2				L= 0.234in W=0.082in
TL3				L= 0.234in W=0.082in
TL4				L= 0.277in W=0.323in

Table 7. Test circuit component part list (continued)

Item	Qty	Part number	Vendor	Description
TL5				L=0.207 in W=0.506in
TL6				L= 0.208in W=0.506in
TL7				L= 0.137in W=0.324in
TL8				L= 0.137in W=0.324in
TL9				L= 0.150in W=0.082in
TL10				L= 0.320in W=0.082in
TL11				L= 1.350in W=0.082in
Board 3X5	1		Rogers Corp	Er=2.55 t=2 Oz H=0.030in

Figure 11. Test circuit



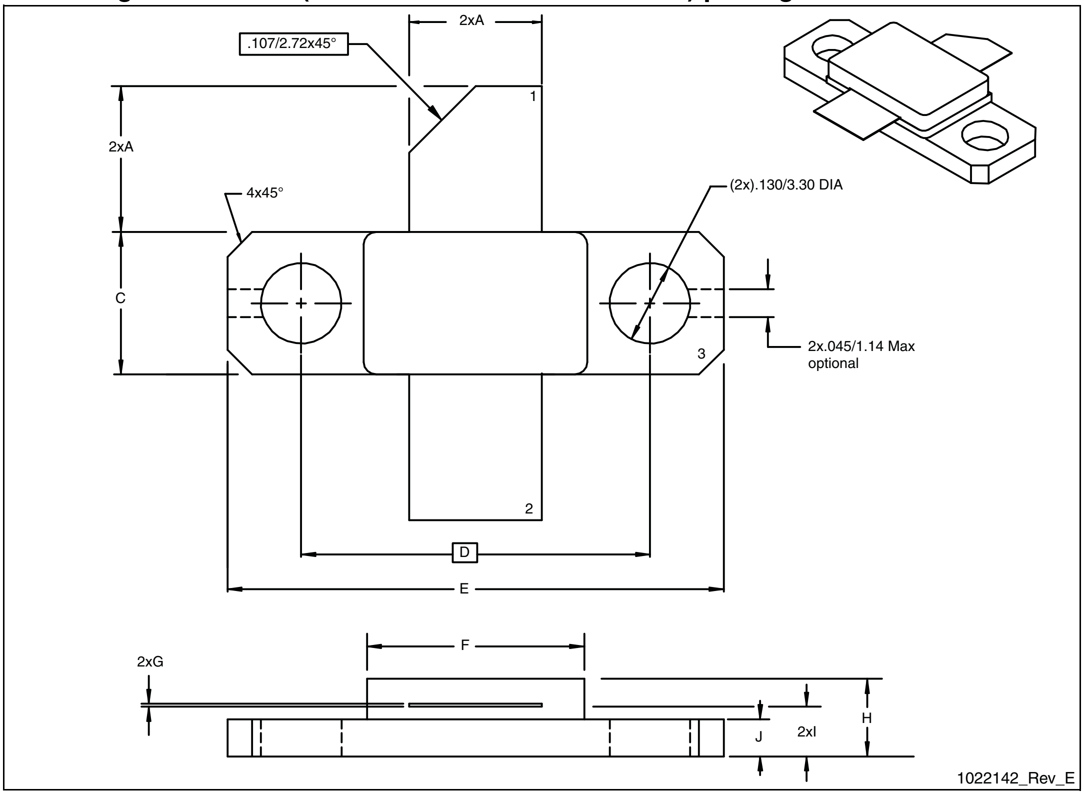
6 Package mechanical data

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. ECOPACK® is an ST trademark.

Table 8. M243 (.230 x .360 2L N/HERM W/FLG) mechanical data

Dim.	mm.			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	5.21		5.72	0.205		0.225
B	5.46		6.48	0.215		0.255
C	5.59		6.10	0.220		0.240
D		14.27			0.562	
E	20.07		20.57	0.790		0.810
F	8.89		9.40	0.350		0.370
G	0.10		0.15	0.004		0.006
H	3.18		4.45	0.125		0.175
I	1.83		2.24	0.072		0.088
J	1.27		1.78	0.050		0.070

Figure 12. M243 (.230 x .360 2L N/HERM W/FLG) package dimensions[a]



a. Controlled dimensions are in inches.

7 Revision history

Table 9. Document revision history

Date	Revision	Changes
12-Oct-2012	1	Initial release.
08-Jul-2013	2	Updated features in cover page and *Table 5: Dynamic*. Added *Section 4: Typical performance* and *Section 5: Test circuit*.