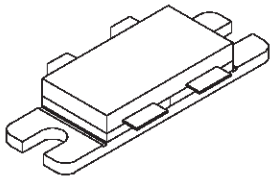
SGS-THOMSON MICROELECTRONICS

SD4590

RF & MICROWAVE TRANSISTORS 800-960 MHz CELLULAR BASE STATION

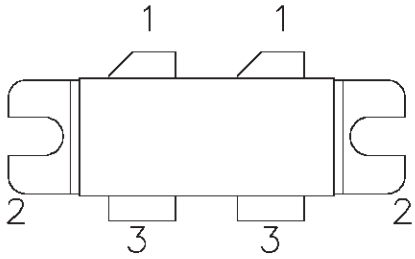
- GOLD METALLIZATION
- DIFFUSED EMITTER BALLASTING
- INTERNAL INPUT/OUTPUT MATCHING
- COMMON EMITTER CONFIGURATION
- DESIGNED FOR LINEAR OPERATION
- HIGH SATURATED POWER CAPABILITY
- 26 VOLT, 900 MHz PERFORMANCE
  P_{OUT} = 150 W MIN.
  GAIN = 8.5 dB MIN.
  IMD_3 = –28dB MAX. @ P_{OUT} = 150W PEP
- INHERENT RUGGEDNESS:
  LOAD MISMATCH TOLERANCE OF 5:1 MIN. VSWR
  3 dB OVERDRIVE CAPABILITY



.400 x .860 4LFL (M208)
epoxy sealed

ORDER CODE	BRANDING
SD4590	SD4590

PIN CONNECTION



1. Collector
2. Emitter
3. Base

DESCRIPTION

The SD4590 is designed for both analog and digital cellular base stations over the 800 to 960 MHz frequency range, specifically those systems requiring the high linearity and efficiency afforded by class AB operation. Integrated input/output prematching simplifies amplifier design. Ruggedness, MTTF, and linearity are enhanced using diffused emitter resistors and refractory/gold metallization.

ABSOLUTE MAXIMUM RATINGS (T_{case} = 25°C)

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Emitter Voltage	65	V
V_{CEO}	Collector-Emitter Voltage	28	V
V_{EBO}	Emitter-Base Voltage	3.5	V
I_C	Device Current	25	A
P_{DISS}	Power Dissipation	300	W
T_J	Junction Temperature	+200	°C
T_{STG}	Storage Temperature	– 65 to +150	°C

THERMAL DATA

$R_{TH(j-c)}$	Junction-Case Thermal Resistance	0.60	°C/W

ELECTRICAL SPECIFICATIONS (T_{case} = 25°C)

STATIC

Symbol	Test Conditions		Value			Unit
			Min.	Typ.	Max.	
BV_{CBO}	I_C = 50mA	V_{BE} = 0V	65	80	—	V
BV_{CEO}	I_C = 100mA	I_B = 0mA	28	30	—	V
BV_{CER}	I_C = 100mA	R_{BE} = 75Ω	33	40	—	V
BV_{EBO}	I_E = 10mA	I_C = 0mA	3.5	4.0	—	V
I_{CEO}	V_{CE} = 30V	V_{BE} = 0V	—	—	10	mA
h_{FE}	V_{CE} = 5V	I_C = 6A	25	45	120	—

Tested per side

DYNAMIC

Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
C_{OB}	f = 1.0 MHz V_{CB} = 26V for information only - this part is collector matched	—	75	—	pF

Tested per side

DYNAMIC (CW)

Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
P_{IN}	f = 900MHz V_{CE} = 26V I_{CQ} = 2 x 200mA P_{OUT} = 150W	—		21	W
P_{OUT}	f = 900MHz V_{CE} = 26V I_{CQ} = 2 x 200mA P_{IN} = 21W	150	175		W
G_P	f = 900MHz V_{CE} = 26V I_{CQ} = 2 x 200mA P_{OUT} = 150W	8.5	9.5	—	dB
ηc	f = 900MHz V_{CE} = 26V I_{CQ} = 2 x 200mA P_{OUT} = 150W	50	55	—	%
P_{1dB}	f = 900MHz V_{CE} = 26V I_{CQ} = 2 x 200mA	150	160		W
OVD	f = 900MHz V_{CC} = 26V I_{CQ} = 2 x 200mA Set P_{OUT} = 150W; Increase P_{IN} 3dB	No Degradation in Device Performance			

DYNAMIC (Two-Tone)

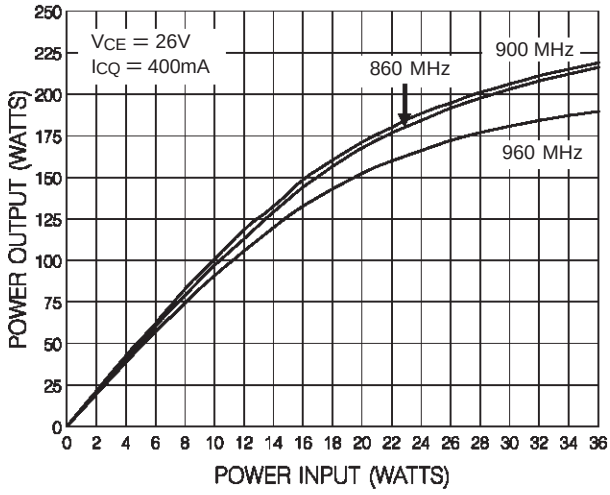
Symbol	Test Conditions	Value			Unit
		Min.	Typ.	Max.	
*G_P	V_{CE} = 26V I_{CQ} = 2 x 200mA P_{OUT} = 150W PEP	8.5	9.5	—	dB
*ηc	V_{CE} = 26V I_{CQ} = 2 x 200mA P_{OUT} = 150W PEP	30	35	—	%
*IMD_3	V_{CE} = 26V I_{CQ} = 2 x 200mA P_{OUT} = 150W PEP	—	–32	–28	dBT
*Load Mismatch	V_{CE} = 26V I_{CQ} = 2 x 200mA P_{OUT} = 150W PEP VSWR = 5:1 MIN @ All phase angles	No Degradation in Device Performance			
*OVD	V_{CE} = 26V I_{CQ} = 2 x 200mA Set P_{OUT} = 150W PEP; Increase P_{IN} 3dB	No Degradation in Device Performance			

*Note: f_1 = 900.00 MHz

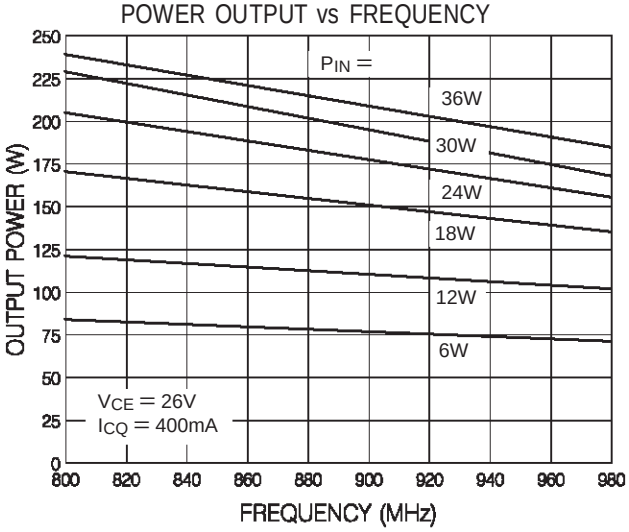
f_2 = 900.10 MHz

TYPICAL PERFORMANCE

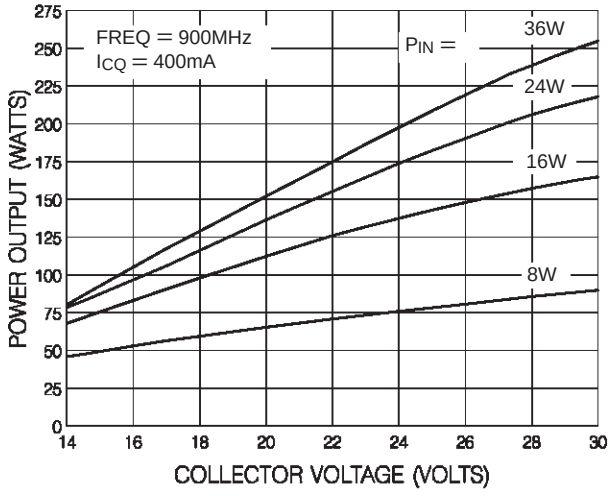
POWER OUTPUT vs POWER INPUT



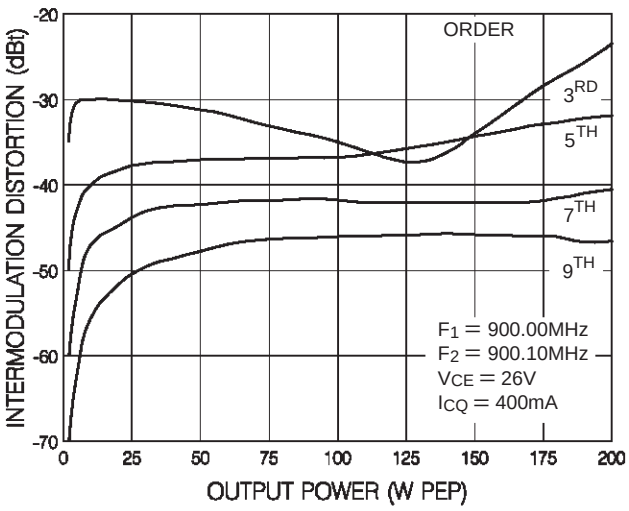
POWER OUTPUT vs FREQUENCY



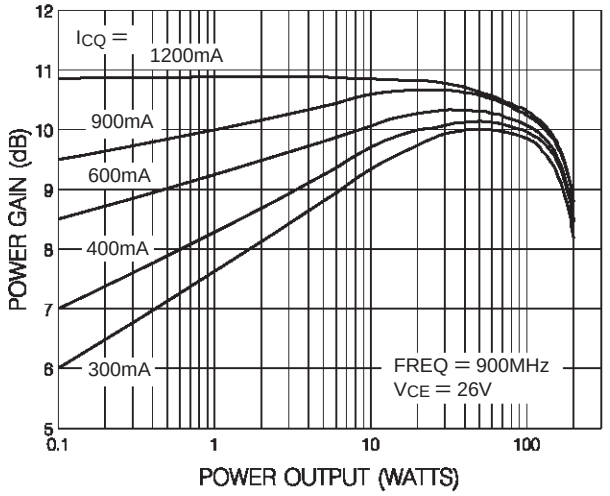
POWER OUTPUT vs SUPPLY VOLTAGE



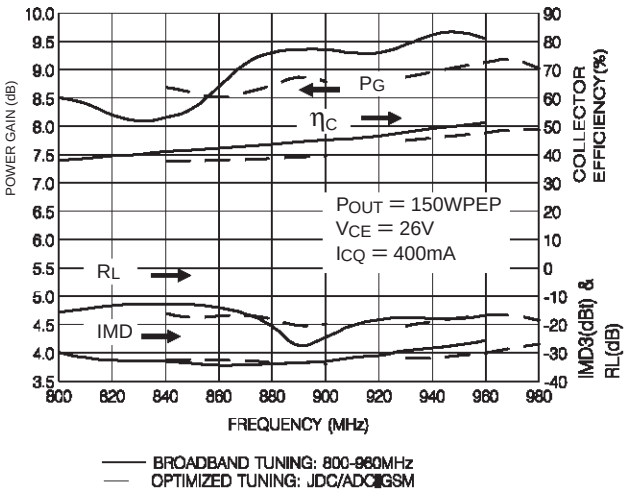
INTERMODULATION DISTORTION vs POWER OUTPUT



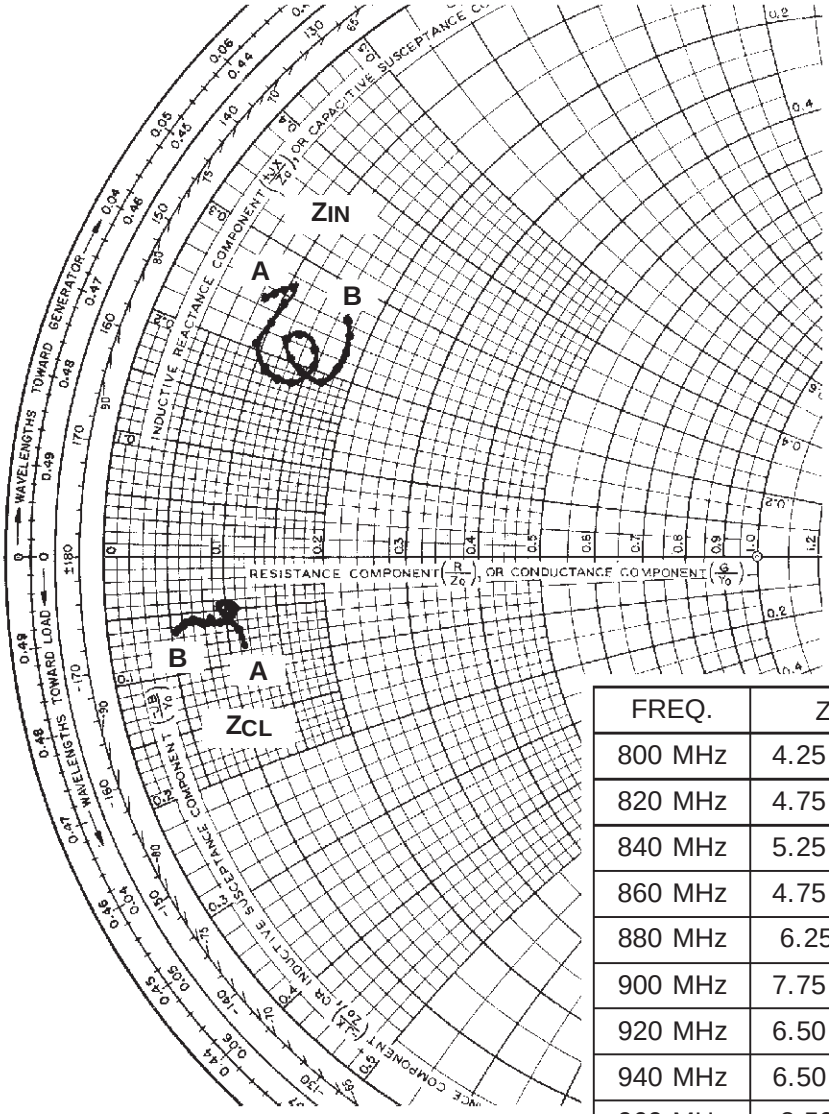
POWER GAIN vs POWER OUTPUT



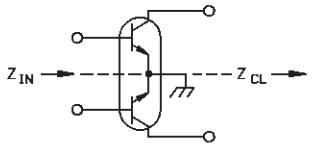
BROADBAND PERFORMANCE



SERIES EQUIVALENT INPUT/OUTPUT IMPEDANCES



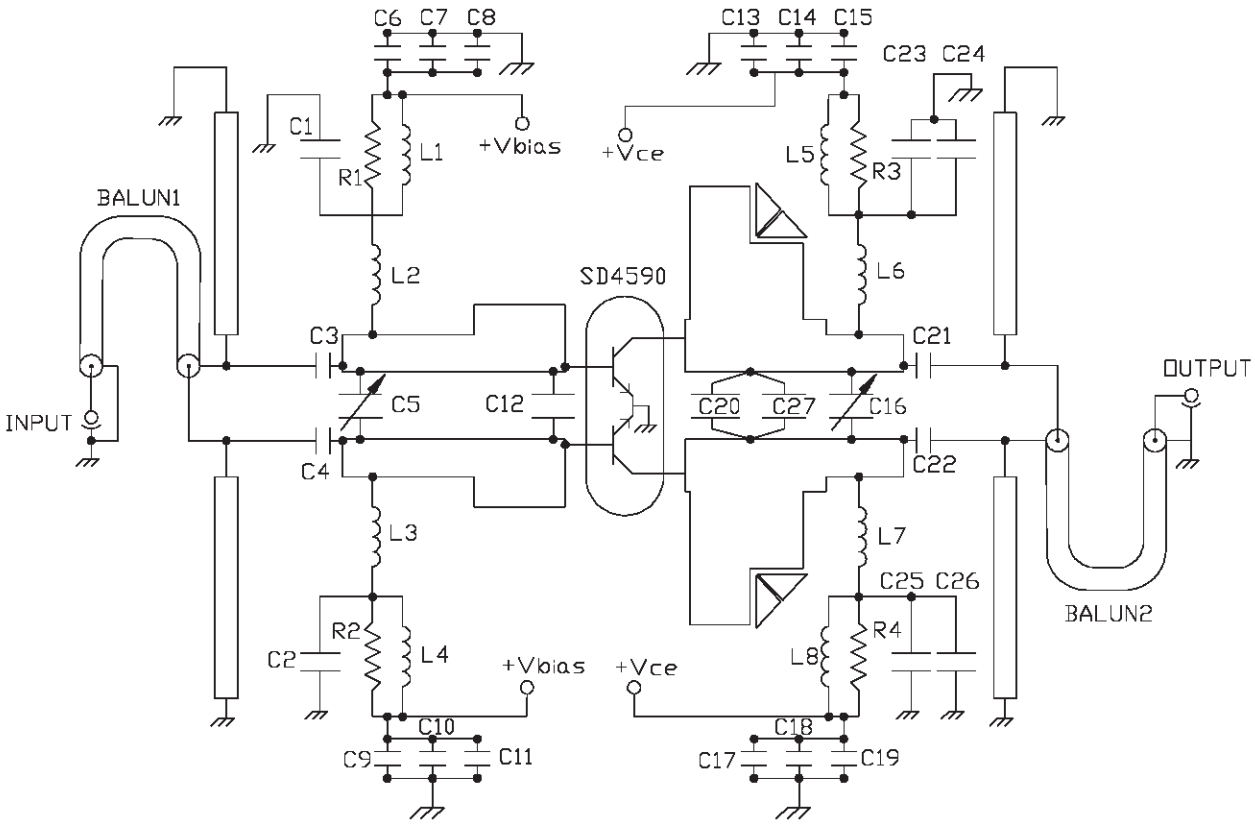
CONDITIONS:
- V_{CE} = 26V
- I_{CQ} = 2 x 200mA
- P_{OUT} = 150W PEP
- $IMD_3 \leq$ –28dBT
- (Δ f_1 f_2 = 100KHz)



FREQ.	Z_{IN} (Ω)	Z_{CL} (Ω)
800 MHz	4.25 + j 12.25	5.75 – j 4.25
820 MHz	4.75 + j 13.25	5.00 – j 2.75
840 MHz	5.25 + j 12.50	5.50 – j 2.50
860 MHz	4.75 + j 10.25	5.00 – j 3.00
880 MHz	6.25 + j 9.00	4.60 – j 2.90
900 MHz	7.75 + j 10.25	4.25 – j 2.90
920 MHz	6.50 + j 11.50	3.95 – j 2.90
940 MHz	6.50 + j 10.25	3.80 – j 2.80
960 MHz	8.50 + j 9.50	3.40 – j 2.85
980 MHz	9.25 + j 11.50	3.10 – j 3.00
1000 MHz	8.50 + j 13.25	2.75 – j 3.15

NOTE: A = 800MHz
B = 1000MHz
(Measured in 10MHz increments)

TEST CIRCUIT



Balun 1, 2 : 50Ω Coaxial Cable Length 2.2”

C1, C2,
C23, C25 : 75pF Ceramic Chip, ATC B
C3, C4,
C21, C22 : 2 x 47pF Ceramic Chip, ATC B
C5, C16 : 0.8 - 8pF Variable, JOHANSON Giga-Trim
C6, C9 : 750pF Ceramic Chip, ATC B
C7, C10 : 39nF Ceramic Chip, ATC B
C8, C11,
C24, C26 : 47µF , 50V Electrolytic
C13, C17 : 100µF , 50V Electrolytic
C12 : 9.1pF, Ceramic Chip, ATC A
C14, C18 : 39nF Ceramic Chip (OPTIONAL)
C15, C19 : 750pF Ceramic Chip (OPTIONAL)

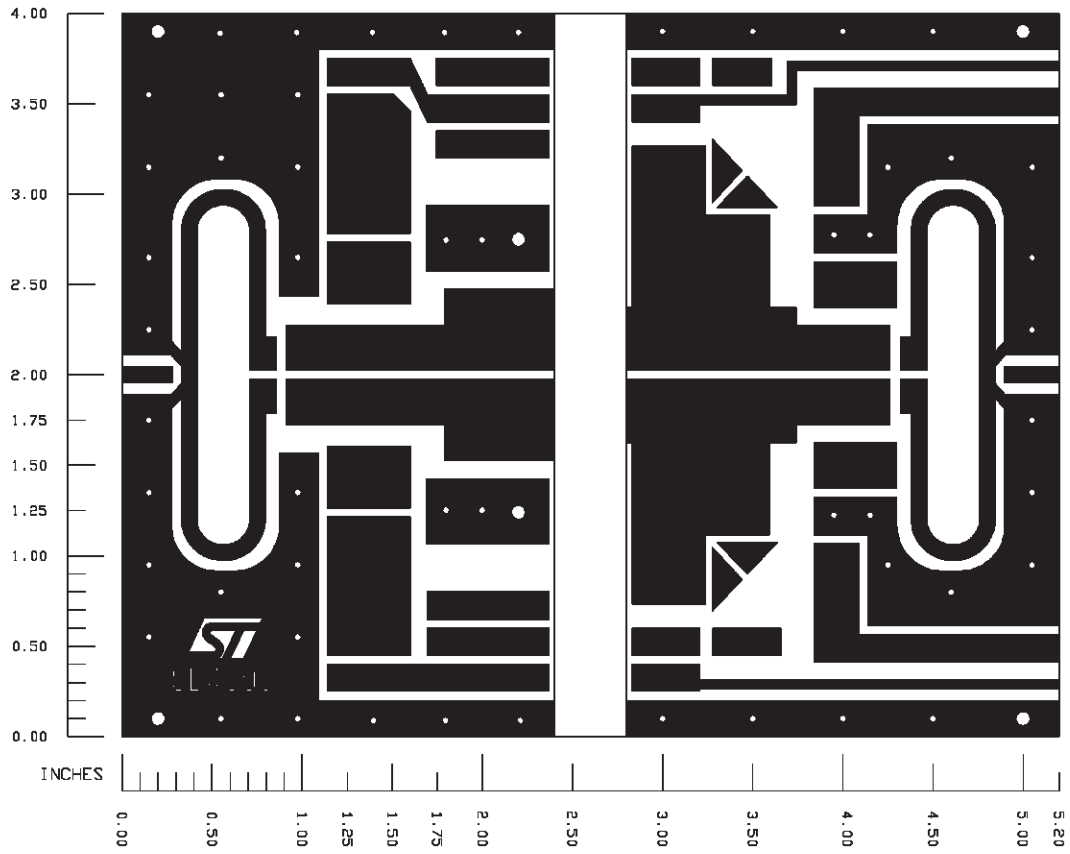
C20 : 1.3pF Ceramic Chip, ATC B
C27 : 0.7pF Ceramic Chip, ATC B

L1, L4,
L5, L8 : 12 Turns, #20 AWG, 0.15” I.D. (Tight)
L2, L3,
L6, L7 : 4 Turns, #20 AWG, 0.13” I.D. (1:1)

R1, R2,
R3, R4 : 5 x 50Ω Chip Resistor

Board
Material : ROGERS, Er = 2.55, Height = 31.25 mil
1 oz. Cu.
See Photomaster for Microstrip Lines.

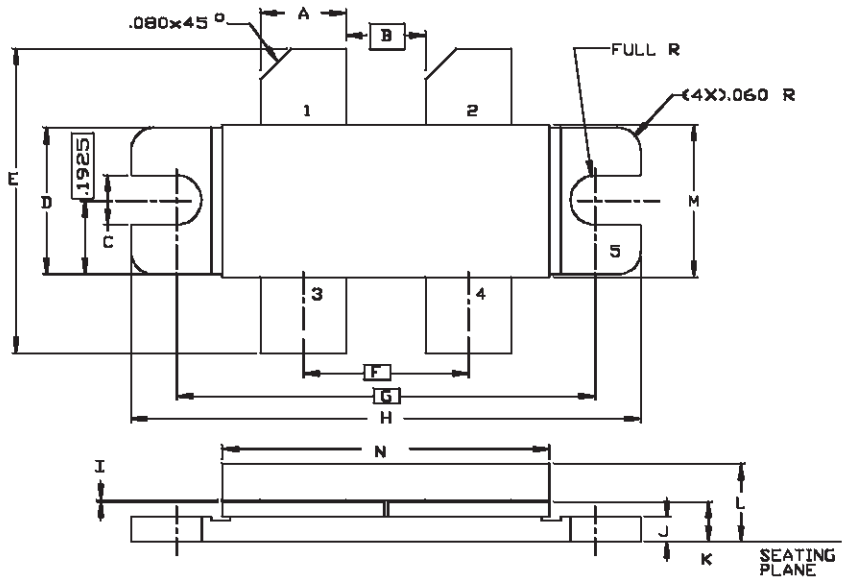
PHOTOMASTER OF TEST CIRCUIT



Approximately 75% of Original

PACKAGE MECHANICAL DATA

Ref.: Dwg. No.12-0208
UDCS No. 1011409 rev C



SGS-THOMSON MICROELECTRONICS		
	MINIMUM Inches/mm	MAXIMUM Inches/mm
A	.220/5,59	.230/5,84
B	.210/5,33	
C	.120/3,05	.130/3,30
D	.380/9,65	.390/9,91
E	.780/19,81	.820/20,83
F	.435/11,05	
G	1.100/27.94	
H	1.335/33,91	1.345/34,16
I	.003/0,08	.007/0,18
J	.060/1,52	.070/1,78

CONT'D		
	MINIMUM Inches/mm	MAXIMUM Inches/mm
K	.082/2,08	.100/2,54
L		.205/5,21
M	.395/10,03	.407/10,34
N	.850/21.59	.870/22,10

PIN: 1. COLLECTOR
2. COLLECTOR
3. BASE
4. BASE
5. EMITTER