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RF Integrated Solutions

0405SC-2200M

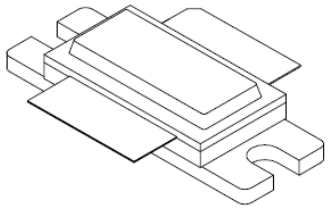
2200Watts, 125 Volts, Class AB
406 to 450 MHz
Silicon Carbide SIT

PRELIMINARY SPECIFICATION

GENERAL DESCRIPTION

The 0405SC-2200M is a **Common Gate N-Channel DEPLETION MODE Class AB SILICON CARBIDE (SiC) STATIC INDUCTION TRANSISTOR (SIT)** capable of providing 2200 Watts of RF Peak power from 406 to 450 MHz. The transistor is designed for use in High Power Amplifiers supporting applications such as UHF Weather Radar and Long Range Tracking Radar. **The device is an addition to the series of High Power Silicon Carbide Transistors from Microsemi RF IS.**

CASE OUTLINE
55TW-FET
(Common Gate)



ABSOLUTE MAXIMUM RATINGS

Voltage and Current

Drain-Source (V_{DSS})	250V
Gate-Source (V_{GS})	-1V

Temperatures

Storage Temperature	-65 to +150°C
Operating Junction Temperature	+250°C

ELECTRICAL CHARACTERISTICS @ 25°C

SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{dss}	Drain-Source Leakage Current	V_{GS} = -20V, V_{DG}= 125V			750	µA
I_{gss}	Gate-Source Leakage Current	V_{GS} = -20V, V_{DS} = 0V			50	µA
θ_{JC}[1]	Thermal Resistance				0.15	ºC/W

FUNCTIONAL CHARACTERISTICS @ 25°C, Vdd = 125V, $I_{dq(ave)}$ = 120 mA, Freq = 406, 425, 450 MHz,

G_{PG}	Common Gate Power Gain	P_{out} = 2200 W, Pulsed	7.0	7.5		dB
P_{in}	Input Power	Pulse Width = 300us, DF = 6%		390	440	W
η_d	Drain Efficiency	F = 450 MHz, P_{out} =1500W	50	55		%
ψ	Load Mismatch	F = 420 MHz, P_{out} = 1500W			10:1	
Po +1dB	Power Output – Higher Drive	F = 450 MHz, Pin = 490 W		2450		W
Vgs	Gate source Voltage	Set for Idq(ave) = 120mA	3.0		10.0	Volts

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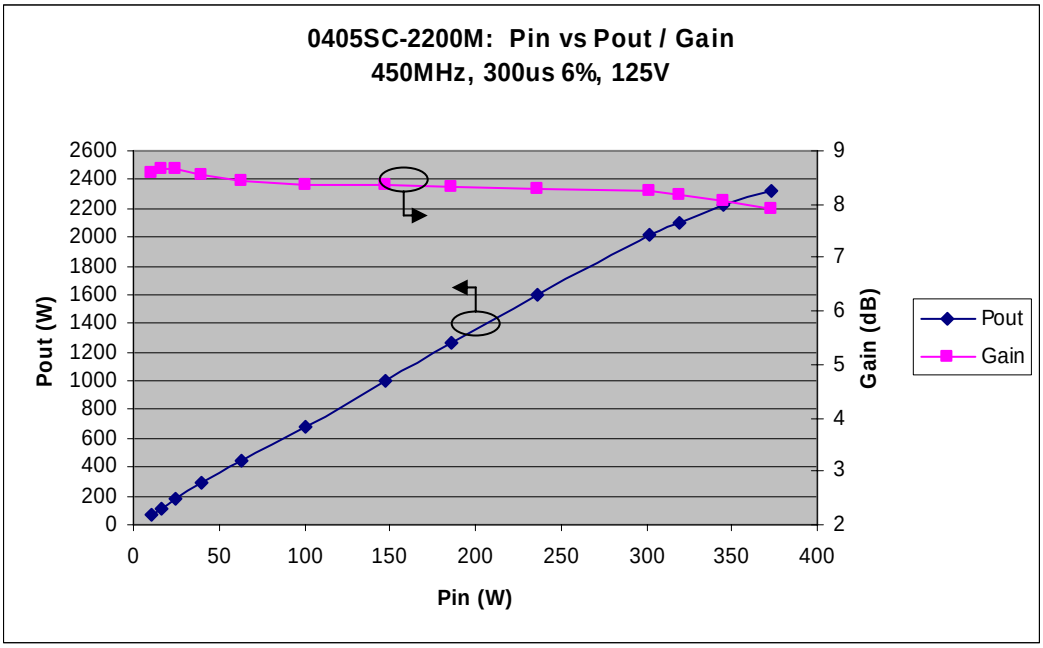
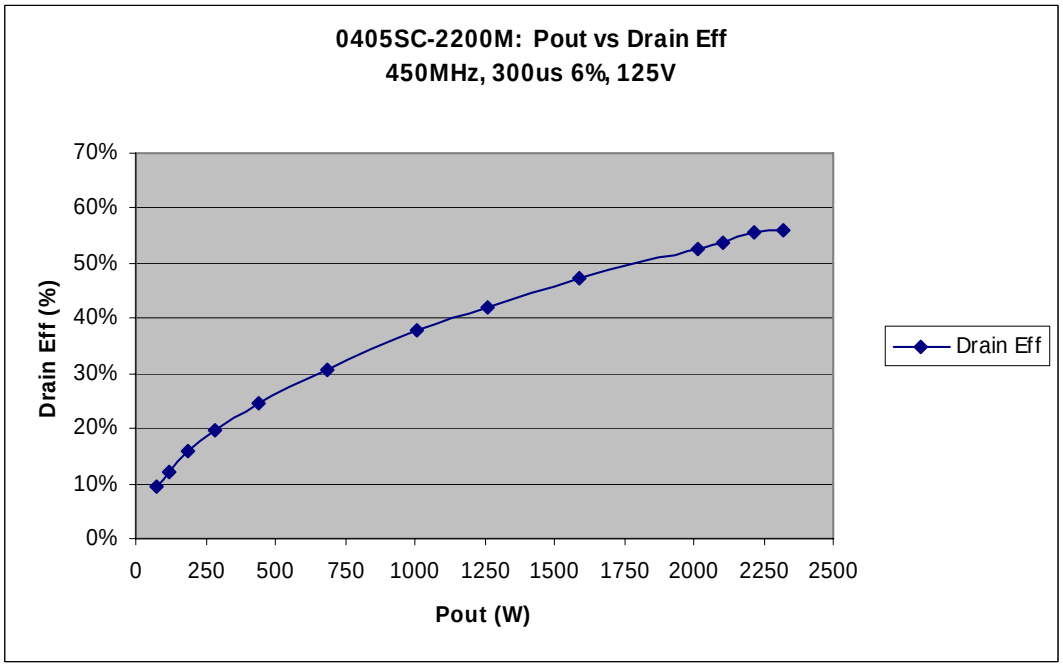
Typical RF Performance Curve





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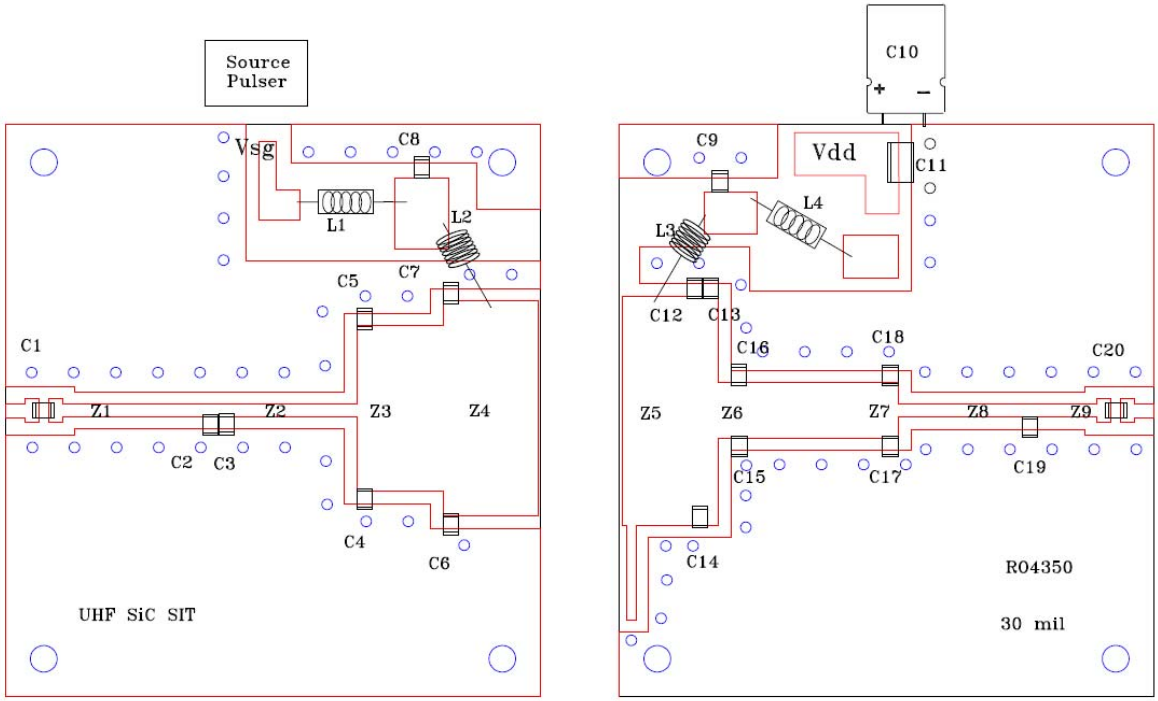
Test Circuit board



0405SC-2200M Test Circuit Component Designations and Values

Part	Description	Part	Description
C1, C8, C9, C20	330pF Chip Capacitor (ATC 100B)	L2, L3	7 Turns, 18AWG, IDIA 0.2”
C2	3.9pF Chip Capacitor (ATC 100B)	L1, L4	Ferrite Coil Inductor
C3	12pF Chip Capacitor (ATC 100B)		
C4	6.8pF Chip Capacitor (ATC 100B)	Z1	65 x 890 mils (W x L)
C5	2.2pF Chip Capacitor (ATC 100B)	Z2	65 x 720 mils (W x L)
C6, C7	33pF Chip Capacitor (ATC 100B)	Z3	865 x 450 mils (W x L)
C10	1000uF 160V Electrolytic Capacitor	Z4	1125 x 500 mils (W x L)
C11	1uf Chip Capacitor	Z5	1200 x 500 mils (W x L)
C12, C13, C14	24pF Chip Capacitor (ATC 100B)	Z6	290 x 105 mils (W x L)
C15	15pF Chip Capacitor (ATC 100B)	Z7	290 x 835 mils (W x L)
C16, C17	22pF Chip Capacitor (ATC 100B)	Z8	65 x 687 mils (W x L)
C18	10pF Chip Capacitor (ATC 100B)	Z9	65 x 420mils (W x L)
C19	8.2pF Chip Capacitor (ATC 100B)		
PCB	Rogers 4350, ε_r=3.48, 30mils, 1oz	Note:	All Z length dimensions include bends

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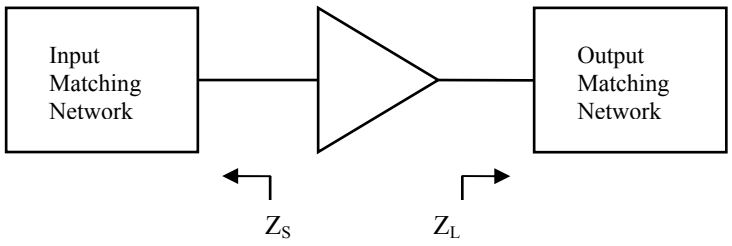
Impedance Information



Typical Impedance Values

Frequency (MHz)	$Z_S(\Omega)$	$Z_L(\Omega)$
406	0.86 – j1.97	0.75 – j0.49
425	0.93 – j1.76	0.87 – j0.25
450	1.05 – j1.51	1.11 + j0.04

* V_{DD} = 125V, I_{DQ} = 120mA avg, P_{out} = 2200W
* Pulse Format: 300µs, 6% Long Term Duty Factor

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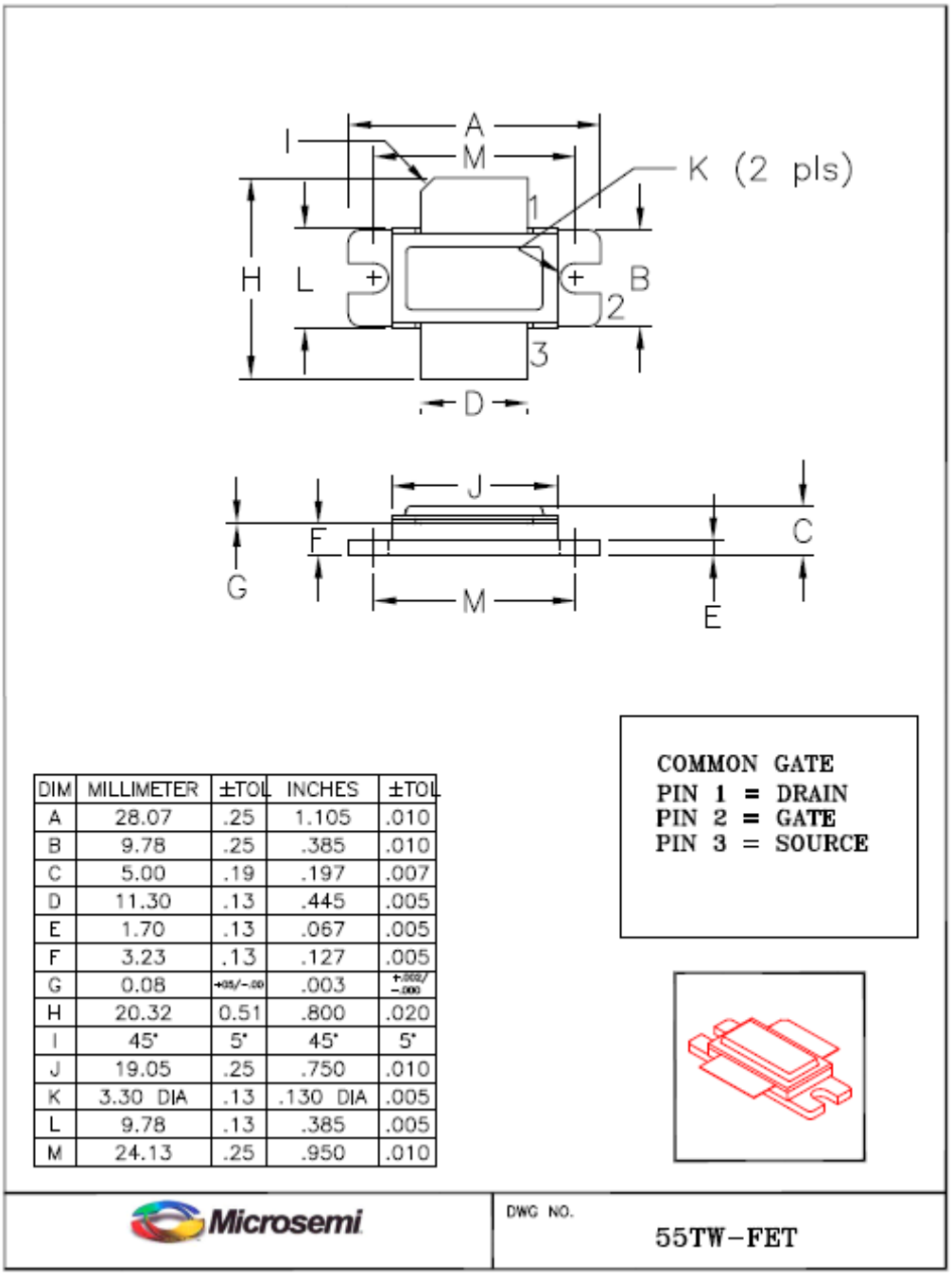
Case Outline 55TW FET



DIM	MILLIMETER	±TOL	INCHES	±TOL
A	28.07	.25	1.105	.010
B	9.78	.25	.385	.010
C	5.00	.19	.197	.007
D	11.30	.13	.445	.005
E	1.70	.13	.067	.005
F	3.23	.13	.127	.005
G	0.08	+.05/-.00	.003	+.002/-.000
H	20.32	0.51	.800	.020
I	45°	5°	45°	5°
J	19.05	.25	.750	.010
K	3.30 DIA	.13	.130 DIA	.005
L	9.78	.13	.385	.005
M	24.13	.25	.950	.010

COMMON GATE
PIN 1 = DRAIN
PIN 2 = GATE
PIN 3 = SOURCE

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DWG NO. 55TW-FET