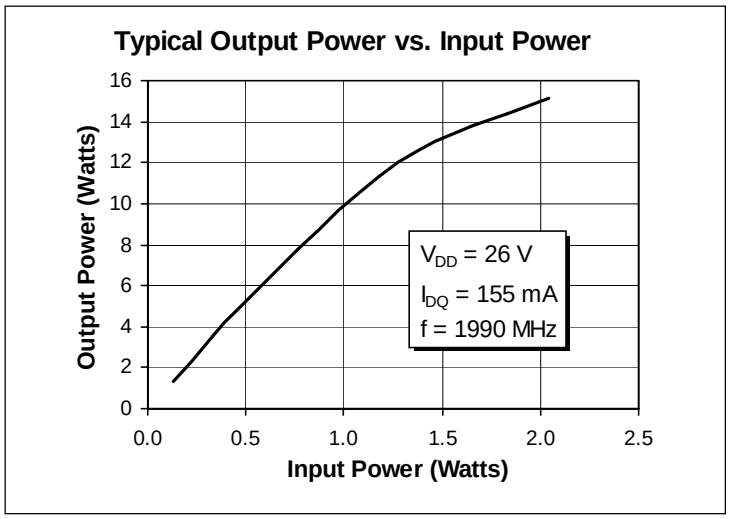
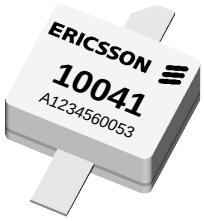
PTF 10041
12 Watts, 1.99 GHz
GOLDMOS® Field Effect Transistor

Description

The PTF 10041 is a 12–watt *GOLDMOS*® FET intended for large signal applications from 1.0 to 2.0 GHz. It operates at 38% efficiency with 13 dB gain. Nitride surface passivation and full gold metallization ensure excellent device lifetime and reliability.

- **Guaranteed Performance at 1.99 GHz, 26 V_{DS}**
  - Output Power = 12 Watts Min
  - Power Gain = 10 dB Min
- **Full Gold Metallization**
- **Silicon Nitride Passivated**
- **Excellent Thermal Stability**
- **Back Side Common Source**
- **100% Lot Traceability**





Package 20249

RF Specifications (100% Tested)

Characteristic	Symbol	Min	Typ	Max	Units
Gain (V_{DD} = 26 V, P_{OUT} = 3 W, I_{DQ} = 155 mA, f = 1930, 1990 MHz)	G_{ps}	10	—	—	dB
Power Output at 1 dB Compression (V_{DD} = 26 V, I_{DQ} = 155 mA, f = 1990 MHz)	P-1dB	12	—	—	Watts
Drain Efficiency (V_{DD} = 26 V, P_{OUT} = 12 W, I_{DQ} = 155 mA, f = 1990 MHz)	η	38	—	—	%
Load Mismatch Tolerance (V_{DD} = 26 V, P_{OUT} = 12 W, I_{DQ} = 155 mA, f = 1990 MHz —all phase angles at frequency of test)	Ψ	—	—	10:1	—

All published data at T_{CASE} = 25°C unless otherwise indicated.

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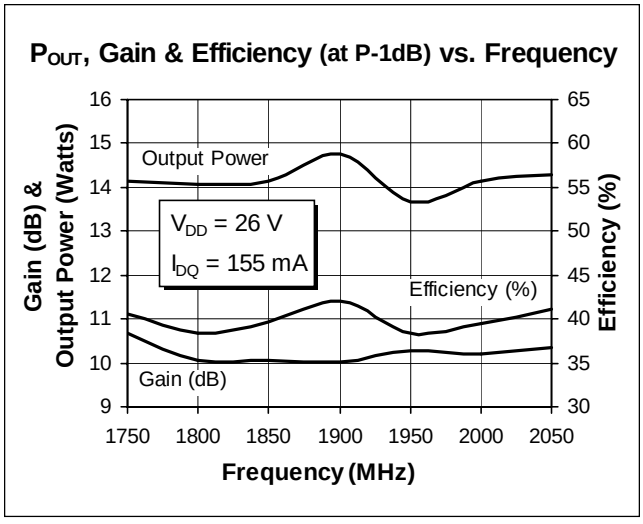
Electrical Characteristics (100% Tested)

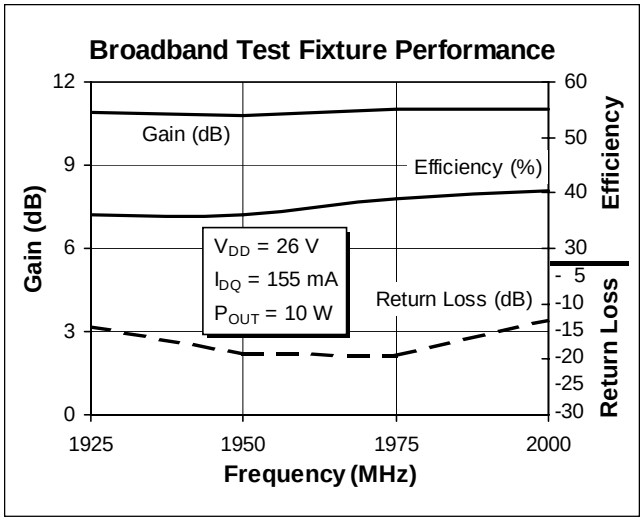
Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 5 mA	$V_{(BR)DSS}$	65	—	—	Volts
Zero Gate Voltage Drain Current	V_{DS} = 26 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	mA
Gate Threshold Voltage	V_{DS} = 10 V, I_D = 75 mA	$V_{GS(th)}$	3.0	—	6.0	Volts
Forward Transconductance	V_{DS} = 10 V, I_D = 2 A	g_{fs}	—	0.8	—	Siemens

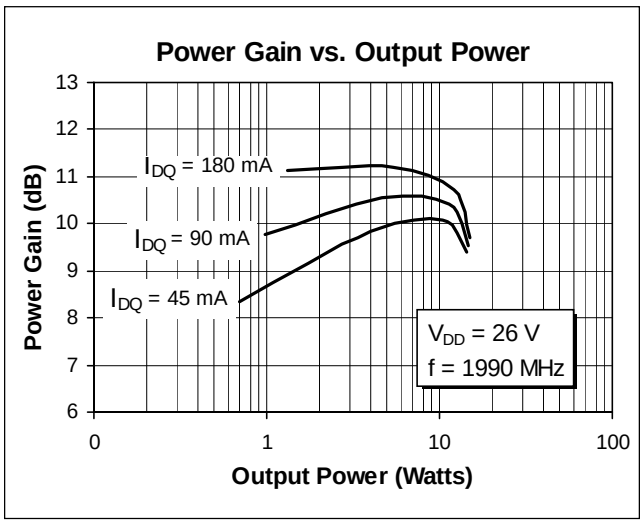
Maximum Ratings

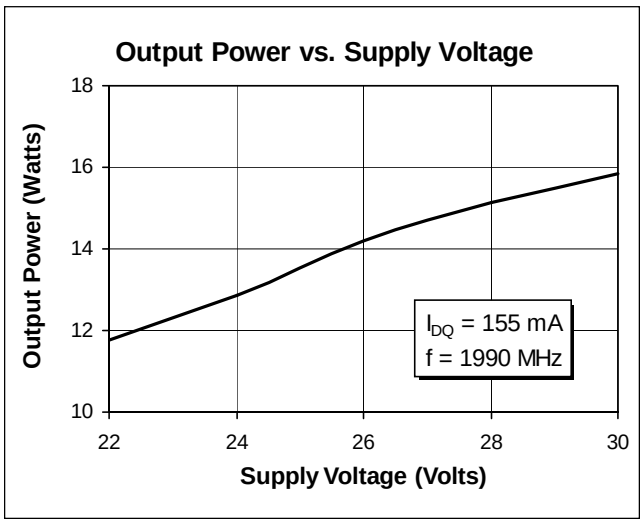
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	±20	Vdc
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation Above 25°C derate by	P_D	58 0.33	Watts W/°C
Storage Temperature	T_{STG}	150	°C
Thermal Resistance (T_{CASE} = 70°C)	$R_{\theta JC}$	3.0	°C/W

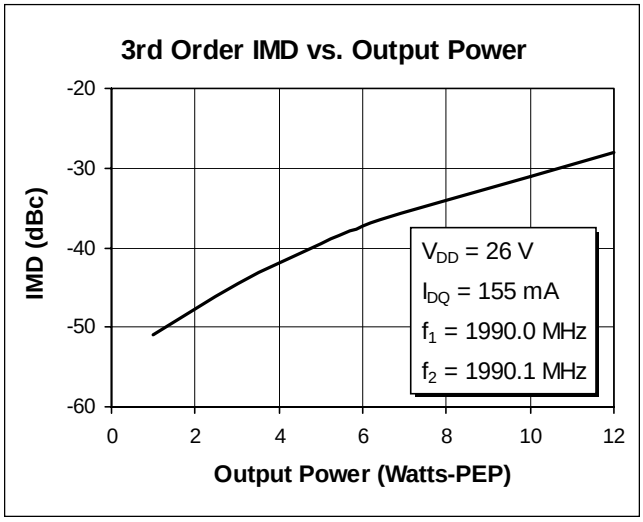
Typical Performance

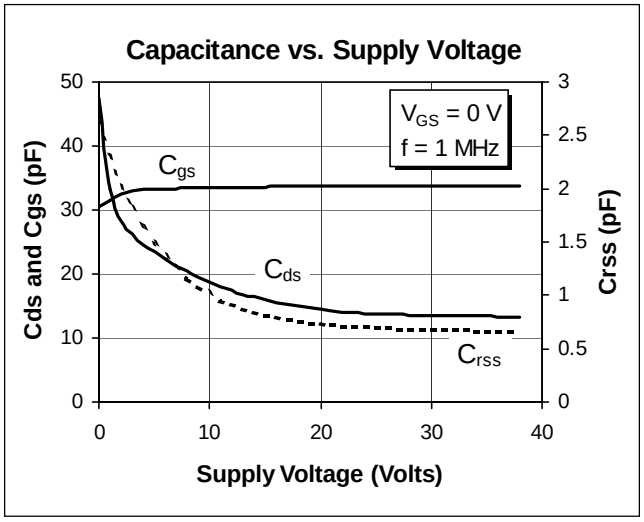


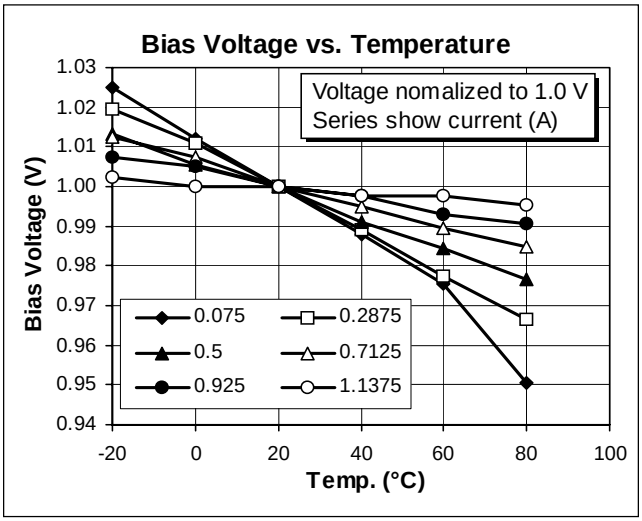



Power Gain vs. Output Power
Power Gain (dB)
Output Power (Watts)
I_{DQ} = 180 mA
I_{DQ} = 90 mA
I_{DQ} = 45 mA
V_{DD} = 26 V
f = 1990 MHz


Output Power vs. Supply Voltage
Output Power (Watts)
Supply Voltage (Volts)
I_{DQ} = 155 mA
f = 1990 MHz


3rd Order IMD vs. Output Power
IMD (dBc)
Output Power (Watts-PEP)
V_{DD} = 26 V
I_{DQ} = 155 mA
f_1 = 1990.0 MHz
f_2 = 1990.1 MHz


Capacitance vs. Supply Voltage
Cds and Cgs (pF)
Crss (pF)
Supply Voltage (Volts)
V_{GS} = 0 V
f = 1 MHz
C_{gs}
C_{ds}
C_{rss}


Bias Voltage vs. Temperature
Bias Voltage (V)
Temp. (°C)
Voltage nomalized to 1.0 V
Series show current (A)
0.075
0.2875
0.5
0.7125
0.925
1.1375

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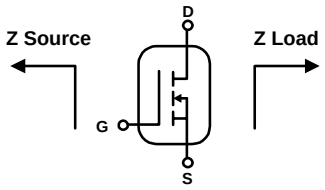
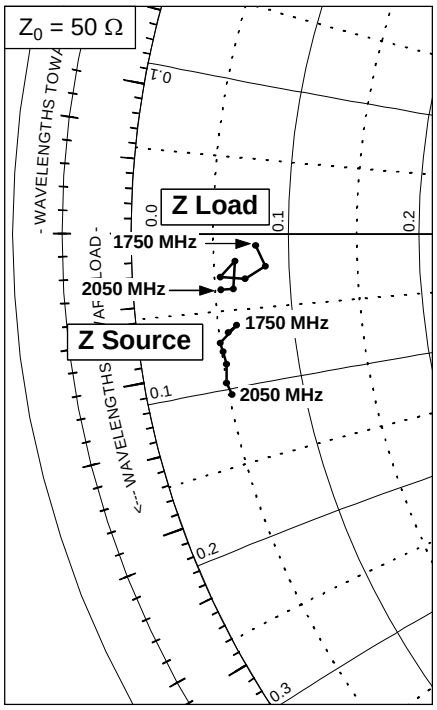
Impedance Data

V_{DD} = 26 V, P_{OUT} = 12 W, I_{DQ} = 155 mA



Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
1750	2.80	-3.2	3.9	-0.4
1800	3.10	-3.0	4.2	-1.1
1850	2.50	-3.5	3.5	-1.5
1900	2.55	-3.8	2.7	-1.4
1950	2.60	-4.2	3.2	-0.9
2000	2.50	-4.8	3.1	-1.8
2050	2.60	-5.2	2.7	-1.8

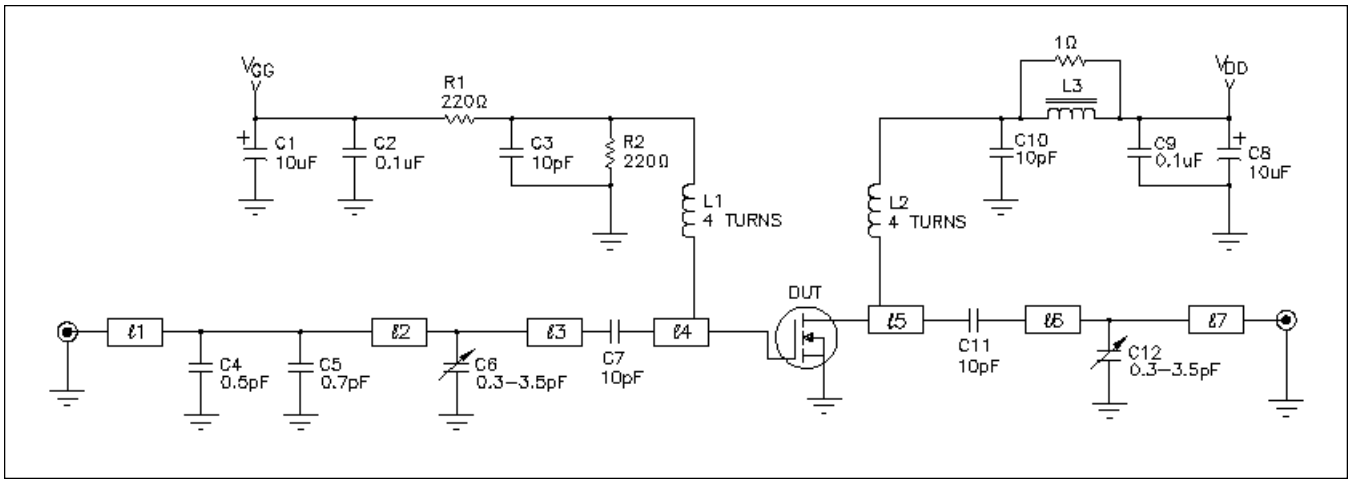


Typical Scattering Parameters

(V_{DS} = 26 V, I_D = 500 mA)

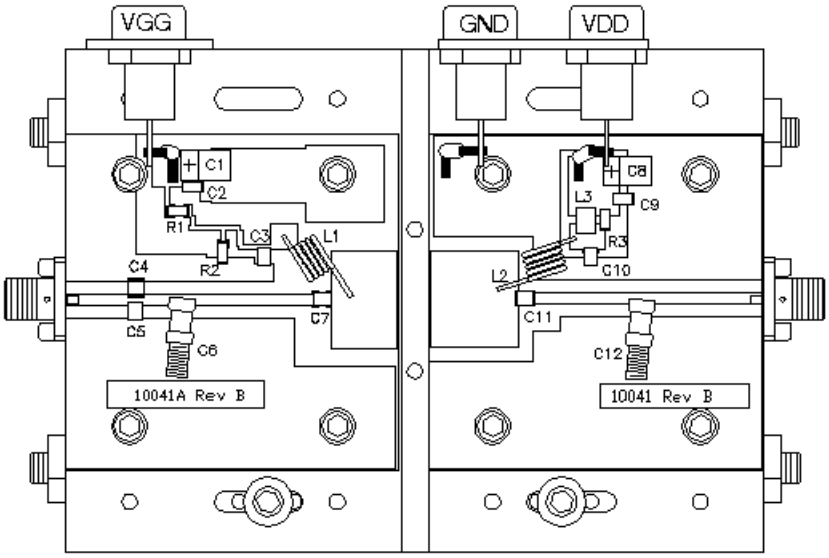
f	S11		S21		S12		S22	
(MHz)	Mag	Ang	Mag	Ang	Mag	Ang	Mag	Ang
100	0.820	-115	27.4	105	0.012	14	0.584	-80
200	0.814	-126	22.3	98	0.012	6	0.583	-90
300	0.865	-147	12.9	71	0.012	-11	0.653	-112
400	0.892	-156	8.73	57	0.010	-20	0.730	-124
500	0.913	-161	6.34	46	0.008	-26	0.791	-132
600	0.927	-165	4.79	37	0.007	-29	0.851	-139
700	0.938	-168	3.70	29	0.005	-25	0.887	-146
800	0.945	-171	2.92	23	0.003	-13	0.895	-152
900	0.954	-173	2.36	17	0.003	7	0.908	-156
1000	0.960	-175	1.94	12	0.003	36	0.914	-159
1100	0.970	-177	1.62	8	0.003	55	0.933	-161
1200	0.974	-179	1.38	3	0.004	67	0.944	-164
1300	0.977	180	1.18	-1	0.005	72	0.953	-166
1400	0.977	178	1.02	-5	0.006	75	0.959	-169
1500	0.977	177	0.894	-9	0.007	76	0.963	-171
1600	0.978	176	0.788	-13	0.008	78	0.964	-173
1700	0.983	174	0.702	-16	0.009	80	0.970	-174
1800	0.987	173	0.631	-20	0.010	79	0.973	-176
1900	0.991	172	0.571	-23	0.011	78	0.976	-178
2000	0.994	171	0.520	-27	0.012	77	0.978	-179
2100	0.992	169	0.477	-31	0.013	76	0.978	179
2200	0.991	168	0.440	-35	0.014	74	0.980	178

Test Circuit

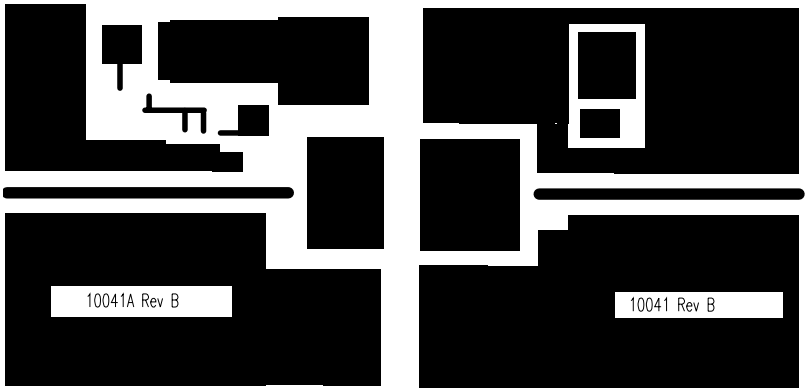


Block Diagram for f = 2 GHz

DUT	PTF 10041	NPN RF Transistor
ℓ1	0.166 λ 2 GHz	Microstrip 8.10 Ω
ℓ2	0.395 λ 2 GHz	Microstrip 50 Ω
ℓ3	0.127 λ 2 GHz	Microstrip 8.10 Ω
ℓ4	0.427 λ 2 GHz	Microstrip 50 Ω
C1,C8	CAPACITOR,10uF	DIGI-KEY PCS6106
C2,C9	CAPACITOR,0.1uF	DIGI-KEY P4525-ND
C3,C7,C10,C11	CAPACITOR, 10pF	ATC 100 B
C4	CAPACITOR,0.5pF	ATC 100 B
C5	CAPACITOR,0.7pF	ATC 100 B
C6,C12	CAPACITOR,VARIABLE,.3-3.5pF	JACO JMC5701
R1, R2	RESISTOR, 220ohm	DIGI-KEY 220ZTR
R3	RESISTOR, 1ohm, LEADED	DIGI-KEY 1.0QBK
L1,L2	4 TURNS,20 AWG, .120 DIA I.D.	N/A
L3	FERRITE,6mm	PHILIPS 53/3/4.6-452
	PCB,G200,.031 DIELECTRIC THICKNESS,2 OZ COPPER Er=4.0	ALLIED SIGNAL



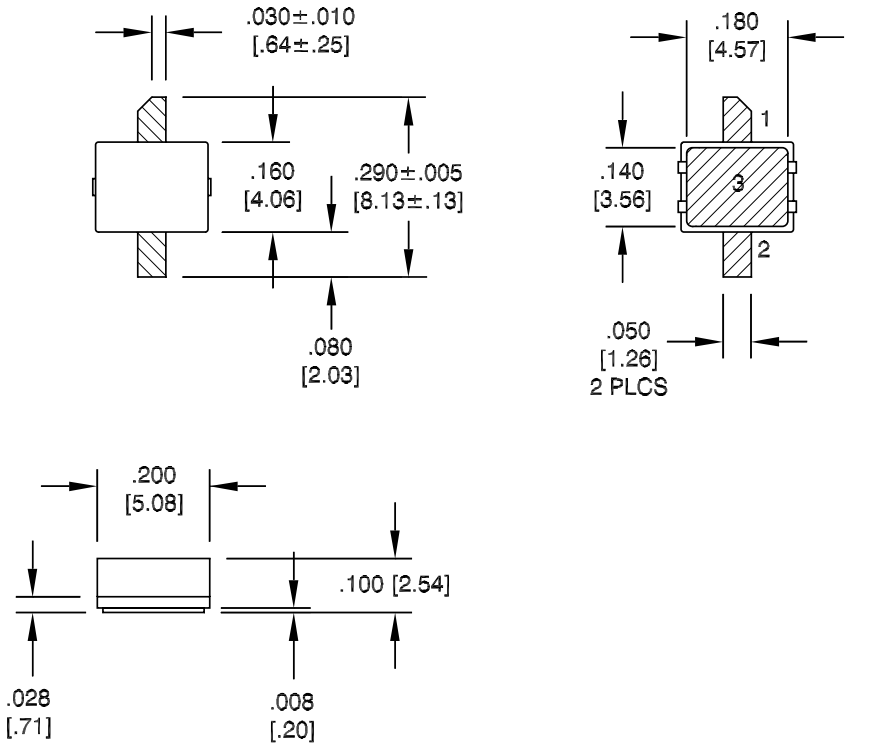
Assembly Diagram (not to scale)



Artwork (scale approximate)

Package Mechanical Specifications

Package 20249



Unless otherwise specified
all tolerances ±.005" [0.13mm]

Pins: 1. Drain 2. Gate 3. Source
Lead Thickness: .008±.001" [0.20±0.03mm]

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