

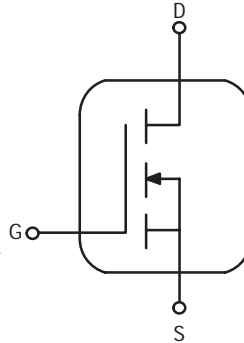
The RF Sub-Micron MOSFET Line  
**RF Power Field Effect Transistor**  
N-Channel Enhancement-Mode Lateral MOSFET

**MRF6522-5R1**

**960 MHz, 5.0 W, 26 V  
LATERAL N-CHANNEL  
RF POWER MOSFET**

Designed for Class A and Class AB common source, linear power amplifiers in the 960 MHz range. The MRF6522-5R1 has been specifically designed for use in Communications Network (GSM) base stations. The package offers the advantage of SMD.

- Specified 26 Volts, 960 MHz, Class AB Characteristics  
Output Power = 5.0 Watts CW  
Power Gain = 17 dB Min @ 960 MHz, 5.0 Watts CW  
Efficiency = 50% Min @ 960 MHz, 5.0 Watts CW
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- S-Parameter Characterization at High Bias Levels
- Bottom Side Source Eliminates DC Isolators, Reducing Common Mode Inductances
- Available in Tape and Reel. R1 Suffix = 500 Units per 12 mm, 7 inch Reel.



CASE 458C-02, STYLE 1

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	65	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$	Vdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	11.7 0.067	Watts W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	200	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (1)	$R_{\theta JC}$	6.86	$^\circ\text{C}/\text{W}$

**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Drain-Source Breakdown Voltage ( $V_{GS} = 0$ Vdc, $I_D = 0.2$ mA)	$V_{(BR)DSS}$	65	—	—	Vdc
Zero Gate Voltage Drain Current ( $V_{DS} = 26$ Vdc, $V_{GS} = 0$ )	$I_{DSS}$	—	—	1.0	$\mu\text{Adc}$
Gate-Source Leakage Current ( $V_{GS} = 20$ Vdc, $V_{DS} = 0$ )	$I_{GSS}$	—	—	1.0	$\mu\text{Adc}$

(1) Thermal resistance is determined under specified RF operating condition.

NOTE - **CAUTION** - MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

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**ELECTRICAL CHARACTERISTICS continued** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**ON CHARACTERISTICS**

Gate Threshold Voltage ( $V_{DS} = 10\text{ V}$ , $I_D = 20\ \mu\text{A}$ )	$V_{GS(th)}$	1.25	3.0	4.0	Vdc
Gate Quiescent Voltage ( $V_{DS} = 26\text{ Vdc}$ , $I_D = 50\text{ mA}$ )	$V_{GS(Q)}$	2.25	4.0	5.0	Vdc
Drain–Source On–Voltage ( $V_{GS} = 10\text{ V}$ , $I_D = 0.25\text{ A}$ )	$V_{DS(on)}$	—	—	0.7	Vdc

**DYNAMIC CHARACTERISTICS**

Input Capacitance ( $V_{DS} = 26\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$	—	6.0	—	pF
Output Capacitance ( $V_{DS} = 26\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{oss}$	—	3.7	—	pF
Reverse Transfer Capacitance ( $V_{DS} = 26\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{rss}$	—	0.3	—	pF

**FUNCTIONAL TESTS** (In Motorola Test Fixture)

Common–Source Power Gain ( $V_{DS} = 26\text{ V}$ , $P_{out} = 5.0\text{ W CW}$ , $I_{DQ} = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$G_{ps}$	17	19	—	dB
Drain Efficiency ( $V_{DS} = 26\text{ V}$ , $P_{out} = 5.0\text{ W CW}$ , $I_{DQ} = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$\eta$	50	55	—	%
Input Return Loss ( $V_{DS} = 26\text{ V}$ , $P_{out} = 5.0\text{ W CW}$ , $I_{DQ} = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	IRL	—	—	–9	dB

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## TYPICAL CHARACTERISTICS

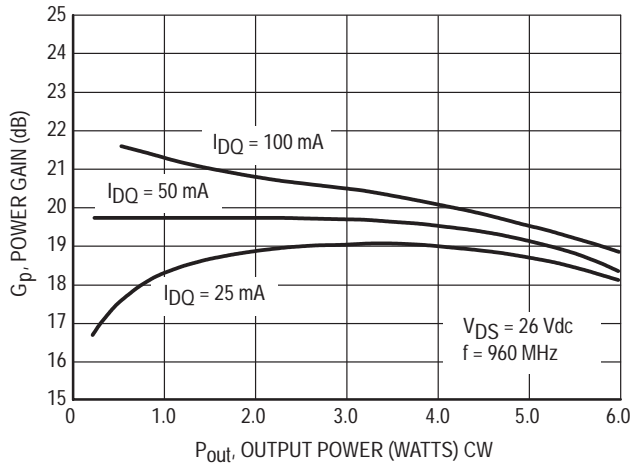


Figure 1. Power Gain versus Output Power

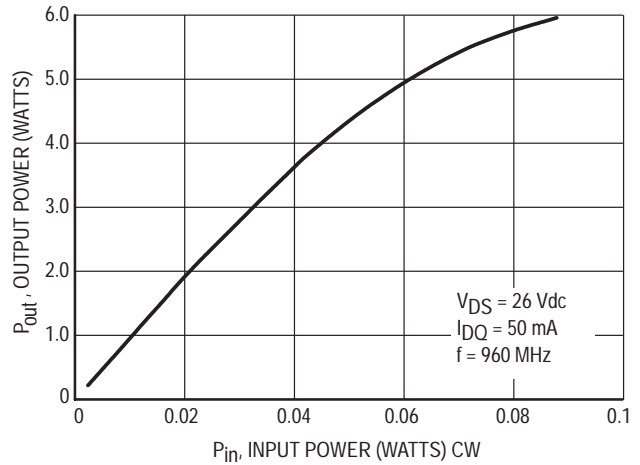


Figure 2. Output Power versus Input Power

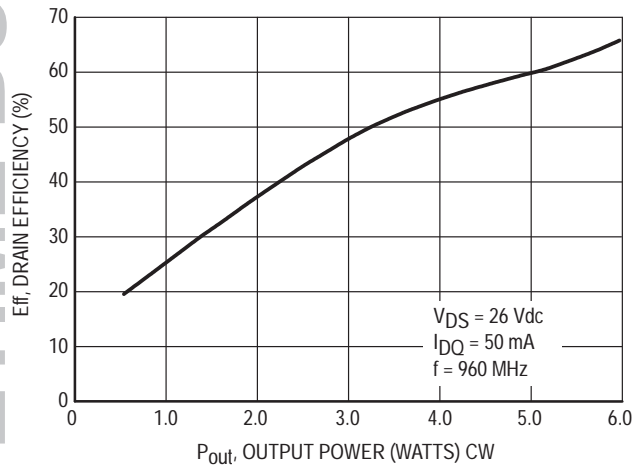


Figure 3. Drain Efficiency versus Output Power

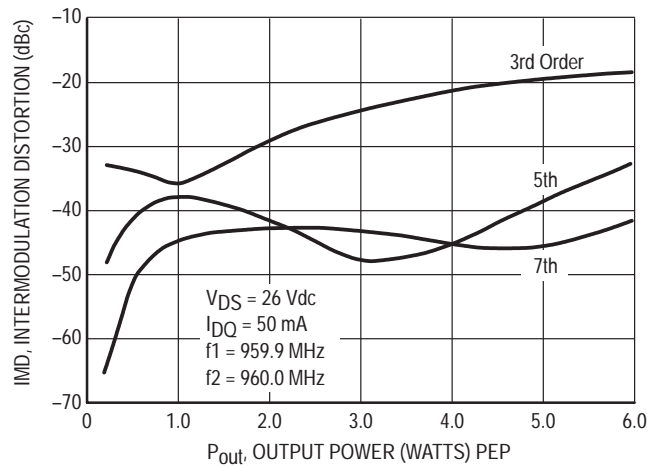
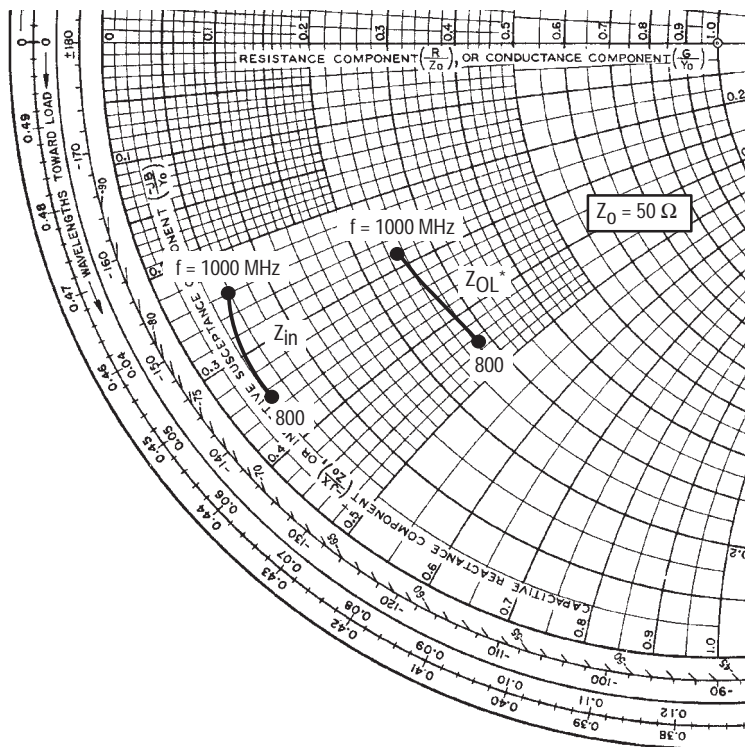


Figure 4. Intermodulation Distortion Products versus Output Power

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f MHz	Z <sub>in</sub> Ohms	Z <sub>OL</sub> * Ohms
800	2.40 - j17.4	14.7 - j22.8
825	2.46 - j16.4	14.1 - j20.8
850	2.50 - j15.8	14.0 - j19.5
875	2.56 - j15.2	13.9 - j17.9
900	2.60 - j14.7	13.8 - j17.3
925	2.71 - j13.7	13.7 - j16.9
950	2.78 - j13.2	13.2 - j15.6
975	2.88 - j12.6	12.9 - j14.4
1000	3.06 - j11.9	12.9 - j14.2

Z<sub>in</sub> = Complex conjugate of source impedance.

Z<sub>OL</sub>\* = Complex conjugate of the optimum load impedance into which the device operates at a given output power, voltage, current and frequency.

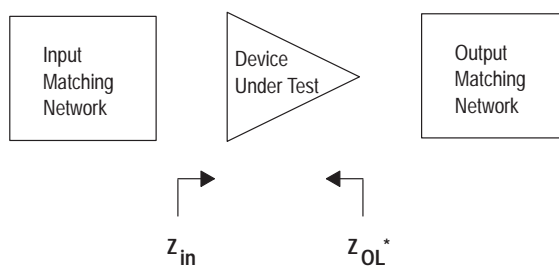


Figure 5. Series Equivalent Input and Output Impedance

Table 1. Common Source S-Parameters at  $V_{DS} = 12$  Vdc,  $I_D = 50$  mAdc

f GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	S <sub>11</sub>	φ	S <sub>21</sub>	φ	S <sub>12</sub>	φ	S <sub>22</sub>	φ
0.500	0.786	-114	5.16	87	0.074	2	0.711	-100
0.525	0.782	-117	4.94	84	0.073	-1	0.709	-102
0.550	0.779	-120	4.74	82	0.074	-2	0.707	-105
0.575	0.777	-122	4.55	79	0.073	-5	0.706	-107
0.600	0.776	-124	4.37	77	0.073	-7	0.707	-109
0.625	0.775	-127	4.20	75	0.073	-9	0.707	-111
0.650	0.774	-129	4.03	73	0.072	-12	0.707	-113
0.675	0.774	-131	3.89	70	0.072	-13	0.710	-115
0.700	0.773	-133	3.74	68	0.071	-14	0.711	-117
0.725	0.774	-134	3.61	66	0.071	-16	0.712	-119
0.750	0.775	-136	3.48	64	0.070	-18	0.715	-120
0.775	0.775	-138	3.36	63	0.069	-20	0.717	-122
0.800	0.776	-139	3.25	61	0.069	-21	0.720	-124
0.825	0.777	-141	3.14	59	0.068	-23	0.723	-125
0.850	0.778	-143	3.03	57	0.067	-25	0.728	-128
0.875	0.779	-144	2.93	55	0.067	-26	0.730	-129
0.900	0.780	-146	2.84	53	0.066	-28	0.733	-130
0.925	0.781	-147	2.75	51	0.064	-29	0.737	-132
0.950	0.783	-149	2.66	50	0.065	-30	0.740	-133
0.975	0.785	-150	2.58	48	0.063	-32	0.742	-134
1.000	0.786	-151	2.51	47	0.063	-33	0.745	-136

Table 2. Common Source S-Parameters at  $V_{DS} = 12$  Vdc,  $I_D = 100$  mAdc

f GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	S <sub>11</sub>	φ	S <sub>21</sub>	φ	S <sub>12</sub>	φ	S <sub>22</sub>	φ
0.500	0.757	-122	6.36	86	0.066	2	0.652	-107
0.525	0.754	-124	6.09	84	0.065	-1	0.650	-109
0.550	0.752	-127	5.84	81	0.065	-3	0.649	-111
0.575	0.750	-129	5.60	79	0.065	-5	0.648	-113
0.600	0.749	-131	5.37	77	0.065	-7	0.649	-115
0.625	0.748	-133	5.16	75	0.065	-8	0.650	-117
0.650	0.747	-135	4.96	73	0.065	-10	0.651	-119
0.675	0.747	-137	4.78	71	0.064	-12	0.654	-121
0.700	0.746	-139	4.60	69	0.064	-14	0.655	-123
0.725	0.747	-140	4.43	67	0.062	-15	0.658	-124
0.750	0.747	-142	4.28	65	0.062	-17	0.660	-126
0.775	0.748	-144	4.13	63	0.062	-18	0.663	-127
0.800	0.748	-145	3.99	61	0.062	-20	0.667	-129
0.825	0.749	-147	3.86	60	0.061	-21	0.670	-130
0.850	0.751	-148	3.73	58	0.060	-22	0.674	-132
0.875	0.751	-150	3.61	56	0.060	-25	0.679	-134
0.900	0.752	-151	3.50	54	0.059	-25	0.681	-135
0.925	0.755	-152	3.39	53	0.058	-27	0.686	-136
0.950	0.756	-154	3.29	51	0.058	-28	0.689	-137
0.975	0.757	-155	3.19	50	0.056	-29	0.692	-139
1.000	0.760	-156	3.10	48	0.056	-30	0.695	-140

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Table 3. Common Source S-Parameters at  $V_{DS} = 12 \text{ Vdc}$ ,  $I_D = 200 \text{ mAdc}$

f GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	S <sub>11</sub>	φ	S <sub>21</sub>	φ	S <sub>12</sub>	φ	S <sub>22</sub>	φ
0.500	0.743	-128	7.18	85	0.059	1	0.607	-113
0.525	0.740	-130	6.87	83	0.059	-1	0.607	-115
0.550	0.739	-132	6.58	81	0.060	-3	0.608	-117
0.575	0.736	-134	6.30	79	0.059	-4	0.608	-119
0.600	0.735	-137	6.05	76	0.059	-7	0.610	-121
0.625	0.735	-138	5.81	74	0.059	-8	0.610	-123
0.650	0.734	-140	5.58	72	0.059	-10	0.612	-124
0.675	0.734	-142	5.38	71	0.058	-11	0.615	-126
0.700	0.733	-144	5.18	69	0.057	-12	0.616	-128
0.725	0.733	-145	4.99	67	0.057	-14	0.620	-129
0.750	0.734	-147	4.82	65	0.057	-16	0.622	-130
0.775	0.735	-148	4.66	64	0.056	-17	0.626	-132
0.800	0.735	-150	4.50	62	0.056	-18	0.630	-133
0.825	0.736	-151	4.35	60	0.055	-19	0.633	-135
0.850	0.737	-153	4.21	58	0.054	-21	0.638	-136
0.875	0.739	-154	4.07	57	0.054	-22	0.642	-138
0.900	0.739	-155	3.95	55	0.053	-24	0.645	-139
0.925	0.741	-156	3.83	53	0.053	-25	0.649	-140
0.950	0.742	-158	3.71	52	0.053	-26	0.653	-141
0.975	0.744	-159	3.61	51	0.052	-27	0.656	-142
1.000	0.746	-160	3.51	49	0.051	-28	0.661	-143

Table 4. Common Source S-Parameters at  $V_{DS} = 26 \text{ Vdc}$ ,  $I_D = 50 \text{ mAdc}$

f GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	S <sub>11</sub>	φ	S <sub>21</sub>	φ	S <sub>12</sub>	φ	S <sub>22</sub>	φ
0.500	0.847	-109	6.45	93	0.047	10	0.729	-80
0.525	0.844	-112	6.20	90	0.047	7	0.726	-83
0.550	0.841	-114	5.98	88	0.046	5	0.724	-85
0.575	0.838	-117	5.75	85	0.047	2	0.722	-88
0.600	0.836	-119	5.54	83	0.047	1	0.721	-90
0.625	0.834	-122	5.36	80	0.047	-2	0.720	-92
0.650	0.831	-124	5.16	78	0.047	-4	0.721	-94
0.675	0.831	-126	4.98	76	0.046	-6	0.722	-96
0.700	0.829	-128	4.81	73	0.045	-8	0.721	-98
0.725	0.827	-130	4.64	71	0.045	-10	0.724	-100
0.750	0.828	-132	4.49	69	0.045	-11	0.725	-102
0.775	0.827	-134	4.35	67	0.045	-12	0.727	-104
0.800	0.826	-136	4.21	65	0.044	-15	0.730	-106
0.825	0.826	-138	4.08	63	0.043	-16	0.731	-107
0.850	0.826	-140	3.94	61	0.043	-18	0.734	-110
0.875	0.826	-141	3.82	59	0.042	-19	0.738	-111
0.900	0.826	-143	3.71	57	0.042	-19	0.740	-113
0.925	0.827	-145	3.59	55	0.041	-22	0.743	-115
0.950	0.827	-146	3.49	54	0.041	-24	0.745	-116
0.975	0.828	-148	3.39	52	0.040	-25	0.747	-117
1.000	0.828	-149	3.30	50	0.039	-26	0.751	-119

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Table 5. Common Source S-Parameters at  $V_{DS} = 26$  Vdc,  $I_D = 150$  mAdc

f GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	S <sub>11</sub>	φ	S <sub>21</sub>	φ	S <sub>12</sub>	φ	S <sub>22</sub>	φ
0.500	0.826	-117	8.37	91	0.039	8	0.626	-85
0.525	0.822	-120	8.04	89	0.039	7	0.625	-88
0.550	0.818	-122	7.74	86	0.039	6	0.623	-90
0.575	0.815	-125	7.43	84	0.039	3	0.622	-92
0.600	0.813	-127	7.16	81	0.038	1	0.624	-94
0.625	0.811	-130	6.90	79	0.038	-1	0.624	-96
0.650	0.808	-132	6.65	77	0.038	-3	0.626	-98
0.675	0.808	-134	6.41	75	0.038	-5	0.627	-100
0.700	0.807	-136	6.19	73	0.038	-5	0.629	-102
0.725	0.806	-138	5.97	71	0.037	-8	0.631	-104
0.750	0.805	-139	5.78	69	0.037	-10	0.635	-106
0.775	0.805	-141	5.59	67	0.037	-11	0.637	-107
0.800	0.804	-143	5.41	65	0.036	-11	0.640	-109
0.825	0.805	-145	5.24	63	0.036	-13	0.643	-111
0.850	0.804	-146	5.07	61	0.034	-14	0.648	-113
0.875	0.805	-148	4.92	59	0.035	-16	0.652	-114
0.900	0.803	-149	4.77	58	0.034	-17	0.655	-116
0.925	0.805	-151	4.63	56	0.034	-18	0.659	-117
0.950	0.806	-152	4.50	54	0.033	-19	0.663	-119
0.975	0.806	-154	4.37	53	0.032	-21	0.666	-120
1.000	0.807	-155	4.25	51	0.031	-22	0.671	-121

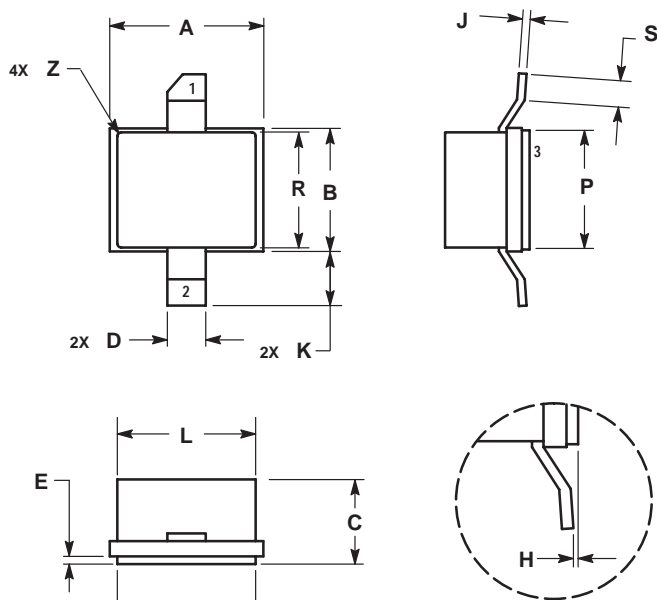
Table 6. Common Source S-Parameters at  $V_{DS} = 26$  Vdc,  $I_D = 300$  mAdc

f GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	S <sub>11</sub>	φ	S <sub>21</sub>	φ	S <sub>12</sub>	φ	S <sub>22</sub>	φ
0.500	0.827	-119	8.39	90	0.036	8	0.612	-84
0.525	0.824	-122	8.06	88	0.036	7	0.612	-86
0.550	0.821	-124	7.74	85	0.036	4	0.611	-89
0.575	0.818	-127	7.44	83	0.036	3	0.611	-91
0.600	0.816	-129	7.17	80	0.035	1	0.612	-93
0.625	0.814	-132	6.90	78	0.035	-1	0.613	-95
0.650	0.812	-134	6.65	76	0.036	-3	0.615	-97
0.675	0.811	-136	6.41	74	0.035	-5	0.617	-99
0.700	0.809	-138	6.19	72	0.035	-6	0.619	-101
0.725	0.809	-139	5.97	70	0.034	-8	0.622	-102
0.750	0.809	-141	5.77	68	0.034	-8	0.625	-104
0.775	0.808	-143	5.58	66	0.034	-10	0.628	-106
0.800	0.808	-145	5.40	64	0.033	-11	0.632	-108
0.825	0.808	-146	5.23	62	0.033	-13	0.635	-109
0.850	0.808	-148	5.06	60	0.032	-15	0.640	-111
0.875	0.808	-150	4.90	58	0.032	-16	0.644	-113
0.900	0.808	-151	4.76	56	0.032	-17	0.647	-114
0.925	0.808	-152	4.62	55	0.031	-18	0.652	-116
0.950	0.809	-154	4.48	53	0.030	-19	0.657	-117
0.975	0.809	-155	4.36	51	0.029	-20	0.659	-119
1.000	0.810	-157	4.23	50	0.029	-22	0.664	-120

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## PACKAGE DIMENSIONS



- NOTES:
1. CONTROLLING DIMENSIONS: INCHES.
  2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
  3. DIMENSION H (PACKAGE COPLANARITY): THE BOTTOM OF LEADS AND REFERENCE PLANE T MUST BE COPLANAR WITHIN DIMENSION H.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.197	0.203	5.004	5.156
B	0.157	0.163	3.988	4.140
C	0.085	0.110	2.159	2.794
D	0.047	0.053	1.194	1.346
E	0.004	0.010	0.102	0.254
H	0.000	0.004	0.000	0.102
J	0.004	0.010	0.102	0.254
K	0.050	0.090	1.270	2.286
L	0.177	0.183	4.496	4.648
N	0.180	0.200	4.572	5.080
P	0.140	0.160	3.556	4.064
R	0.147	0.153	3.734	3.886
Z	---	0.020	---	0.508

- STYLE 1:  
 PIN 1. DRAIN  
 2. GATE  
 3. SOURCE

**CASE 458C-02  
 ISSUE C**

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