



# LET9045S

## RF POWER TRANSISTORS

### Ldmos Enhanced Technology in Plastic Package

#### TARGET DATA

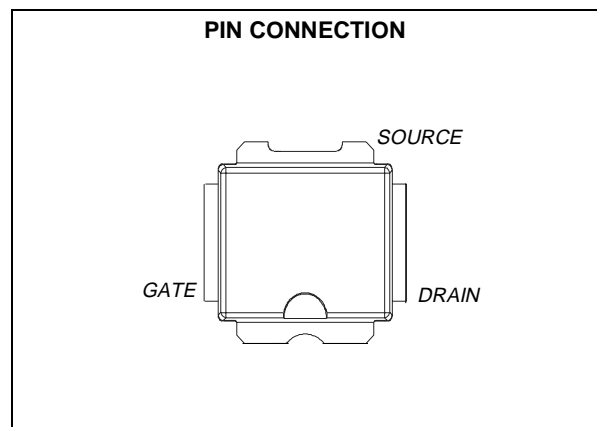
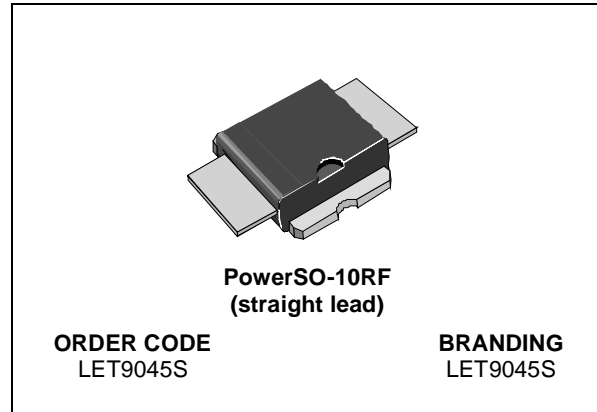
#### N-CHANNEL ENHANCEMENT-MODE LATERAL MOSFETs

- EXCELLENT THERMAL STABILITY
- COMMON SOURCE CONFIGURATION
- $P_{OUT} = 45\text{ W}$  with 17 dB gain MIN @ 945 MHz / 28V
- NEW RF PLASTIC PACKAGE
- HIGH GAIN
- ESD PROTECTION
- AVAILABLE IN TAPE & REEL with TR SUFFIX

#### DESCRIPTION

The LET9045S is a common source N-Channel, enhancement-mode lateral Field-Effect RF power transistor. It is designed for high gain, broad band commercial and industrial applications. It operates at 28 V in common source mode at frequencies up to 1 GHz. LET9045S boasts the excellent gain, linearity and reliability of ST's latest LDMOS technology mounted in the first true SMD plastic RF power package, PowerSO-10RF. LET9045S's superior linearity performance makes it an ideal solution for base station applications.

The PowerSO-10 plastic package, designed to offer high reliability, is the first ST JEDEC approved, high power SMD package. It has been specially optimized for RF needs and offers excellent RF performances and ease of assembly.



Mounting recommendations are available in [www.st.com/rf/](http://www.st.com/rf/) (look for application note AN1294)

#### ABSOLUTE MAXIMUM RATINGS ( $T_{CASE} = 25^{\circ}\text{C}$ )

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-Source Voltage	65	V
$V_{GS}$	Gate-Source Voltage	-0.5 to +15	V
$I_D$	Drain Current	5	A
$P_{DISS}$	Power Dissipation	160	W
$T_j$	Max. Operating Junction Temperature	165	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature	-65 to +150	$^{\circ}\text{C}$

#### THERMAL DATA

$R_{th(j-c)}$	Junction -Case Thermal Resistance	0.85	$^{\circ}\text{C/W}$
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## LET9045S

### ELECTRICAL SPECIFICATION (T<sub>CASE</sub> = 25°C)

#### STATIC

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V	I <sub>DS</sub> = 1 mA	65			V
I <sub>DSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V			1	μA
I <sub>GSS</sub>	V <sub>GS</sub> = 5 V	V <sub>DS</sub> = 0 V			1	μA
V <sub>GS(Q)</sub>	V <sub>DS</sub> = 28 V	I <sub>D</sub> = 250 mA	2.0		5.0	V
V <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 3 A		0.6		V
G <sub>FS</sub>	V <sub>DS</sub> = 10 V	I <sub>D</sub> = 3 A	2.0			mho
C <sub>ISS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V		60		pF
C <sub>OSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V		33		pF
C <sub>RSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V		2.2		pF

#### DYNAMIC (f = 945 MHz)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
G <sub>P</sub>	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA P <sub>OUT</sub> = 45 W PEP	17			dB
η <sub>D</sub>	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA P <sub>OUT</sub> = 45 W PEP		44		%
IMD3	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA P <sub>OUT</sub> = 45 W PEP			-28	dBc
P <sub>1dB</sub>	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA		60		W
G <sub>P</sub>	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA P <sub>OUT</sub> = 45 W		17.8		dB
η <sub>D</sub>	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA P <sub>OUT</sub> = 45 W		59		%
Load mismatch	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA P <sub>OUT</sub> = 45 W ALL PHASE ANGLES	10:1			VSWR

#### DYNAMIC (f = 925 - 960 MHz)

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
P <sub>1dB</sub>	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA		55		W
G <sub>P</sub>	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA P <sub>OUT</sub> = 45 W		17.2		dB
η <sub>D</sub>	V <sub>DD</sub> = 28 V	I <sub>DQ</sub> = 250 mA P <sub>OUT</sub> = 45 W		55		%

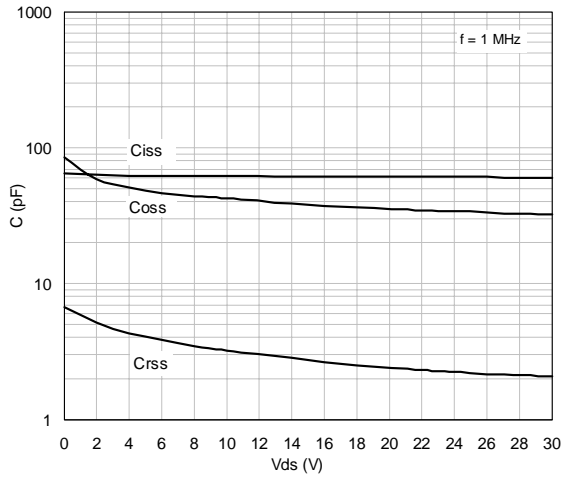
#### ESD PROTECTION CHARACTERISTICS

Test Conditions	Class
Human Body Model	2
Machine Model	M3

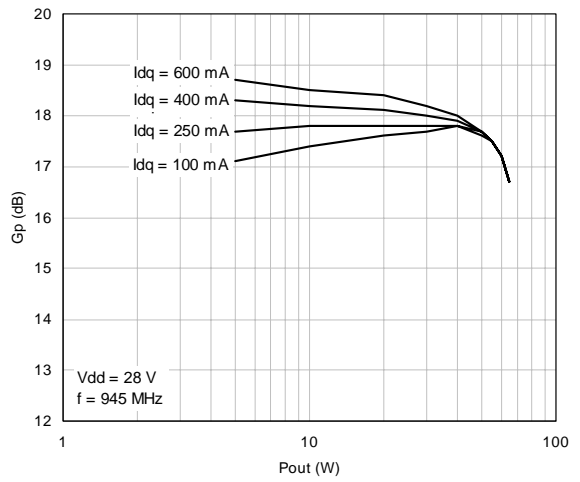
#### MOISTURE SENSITIVITY LEVEL

Test Methodology	Rating
J-STD-020B	MSL 3

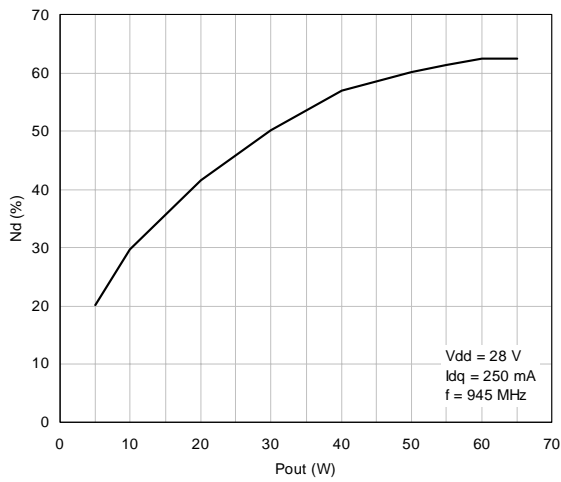
TYPICAL PERFORMANCE  
Power Gain Vs Output Power



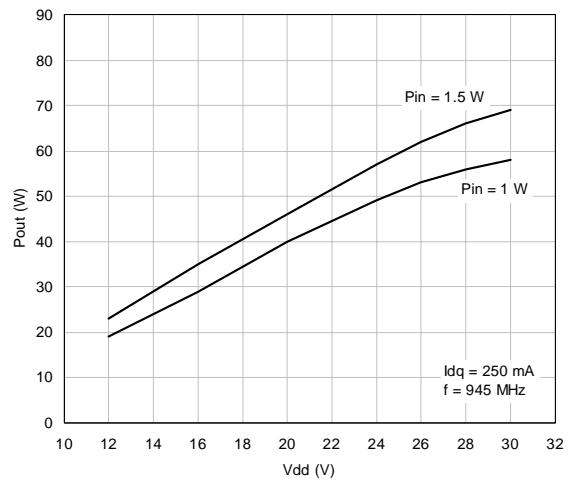
Power Gain Vs Output Power



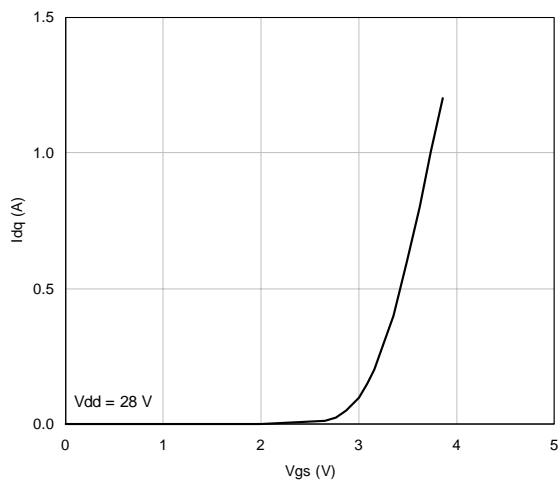
Efficiency Vs Output Power



Output Power Vs Drain Voltage



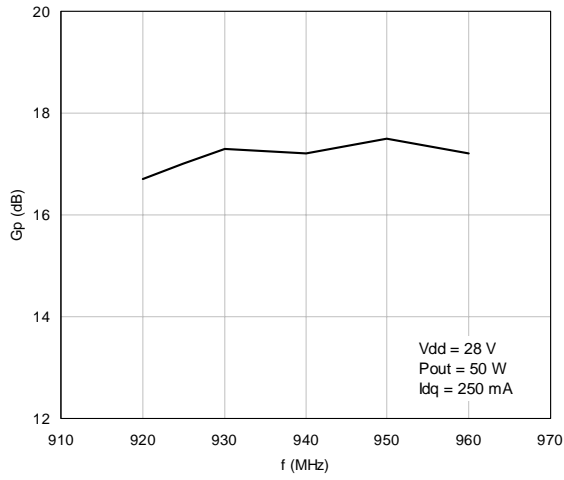
Drain Current Vs Gate-Source Voltage



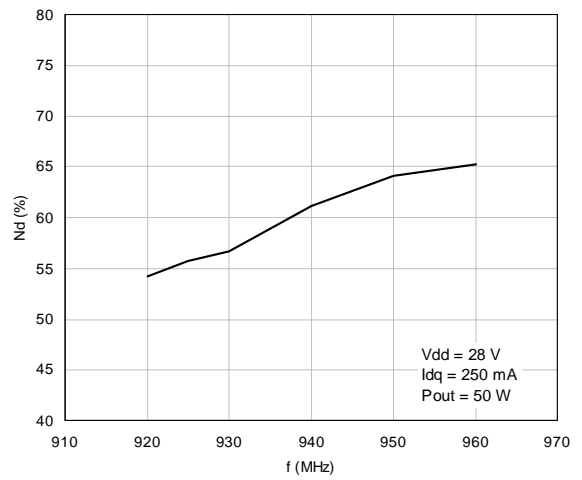
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## TYPICAL PERFORMANCE (BROADBAND)

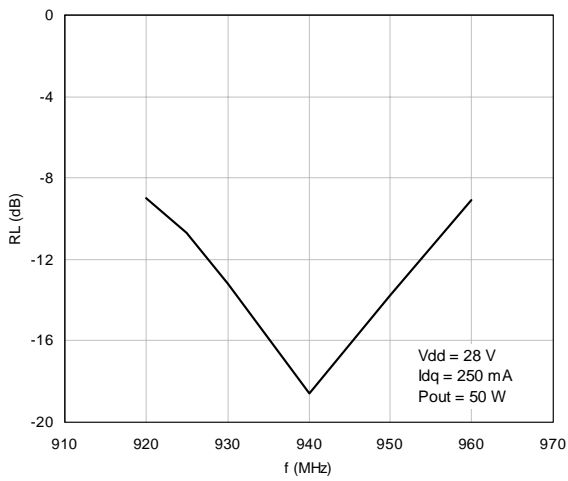
### Power Gain Vs Frequency



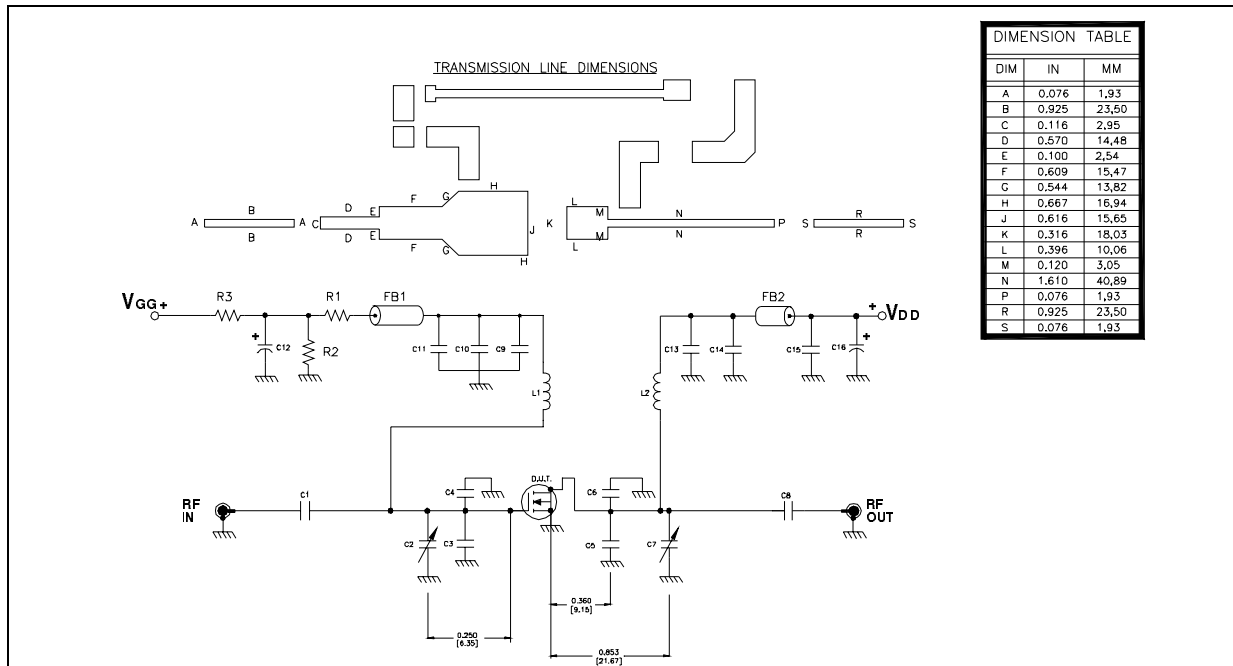
### Efficiency Vs Frequency



### Input Return Loss Vs Frequency



TEST CIRCUIT SCHEMATIC

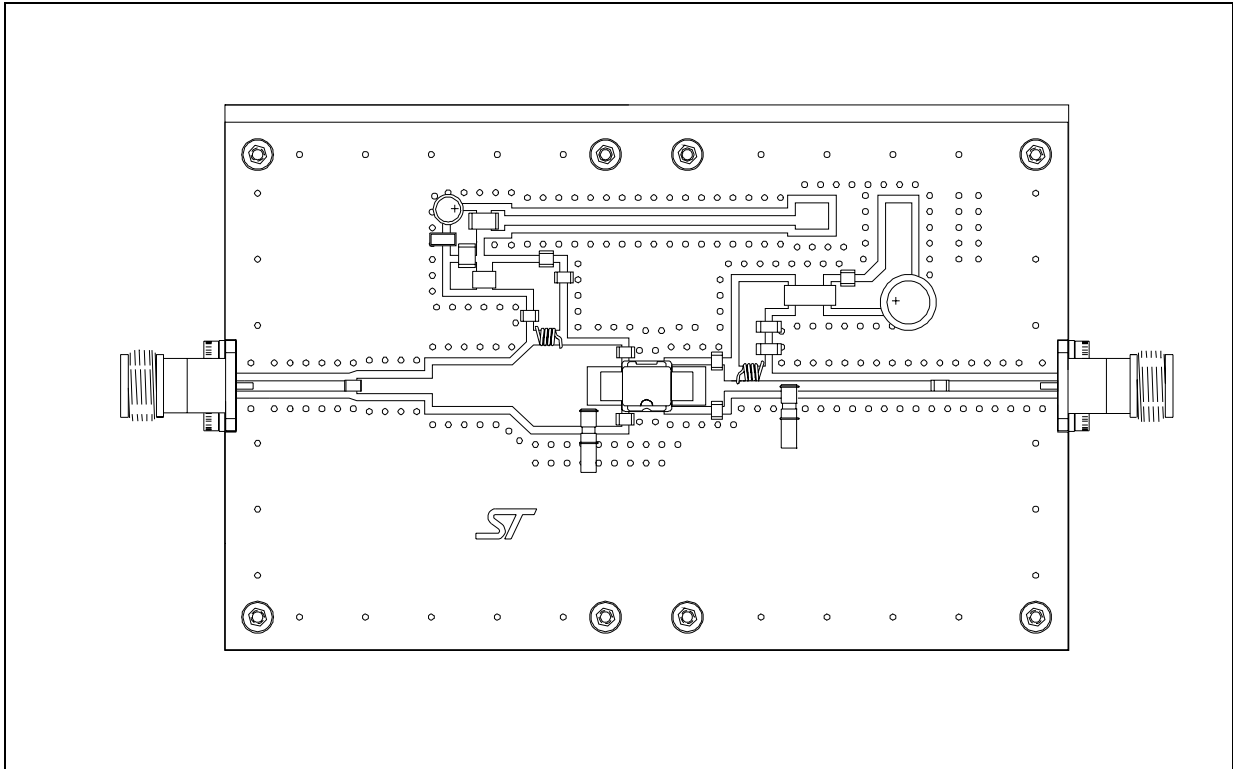


TEST CIRCUIT COMPONENT PART LIST

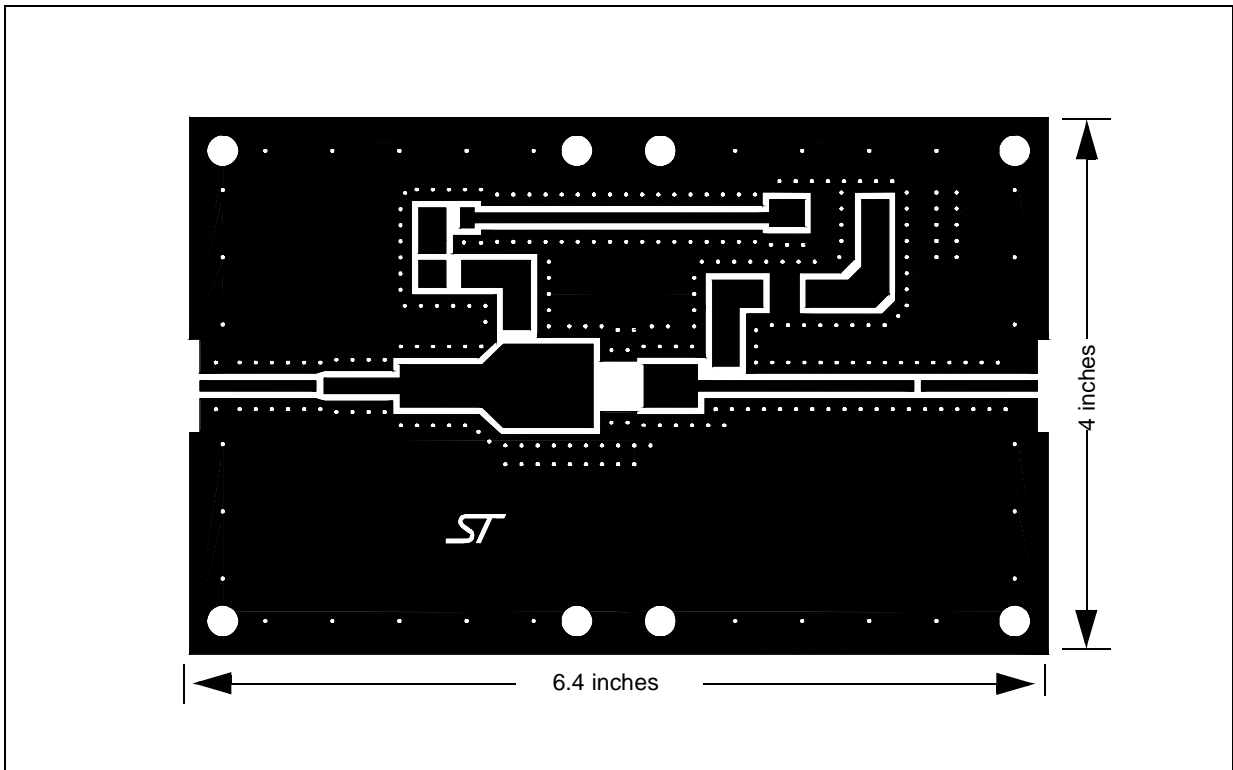
COMPONENT	DESCRIPTION
C1, C8, C9, C13	47pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR
C2, C7	0.8-8.0pF GIGA TRIM VARIABLE CAPACITOR
C3, C4, C5, C6	7.5pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR
C10	1000pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR
C11, C15	0.1μF / 500V SURFACE MOUNT CERAMIC CHIP CAPACITOR
C12	10μF / 50V ALUMINUM ELECTROLYTIC RADIAL LEAD CAPACITOR
C14	100pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR
C16	220μF / 63V ALUMINUM ELECTROLYTIC RADIAL LEAD CAPACITOR
R1	18KΩ, 1W SURFACE MOUNT CHIP RESISTOR
R2	4.7MΩ, 1W SURFACE MOUNT CHIP RESISTOR
R3	120Ω, 2W SURFACE MOUNT CHIP RESISTOR
FB1, FB2	SHIELD BEAD SURFACE MOUNT EMI
L1, L2	INDUCTOR, 5TURNS AIR WOUND #22AWG, ID=0.059[1.49], NYLON COATED MAGNET WIRE

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## TEST CIRCUIT

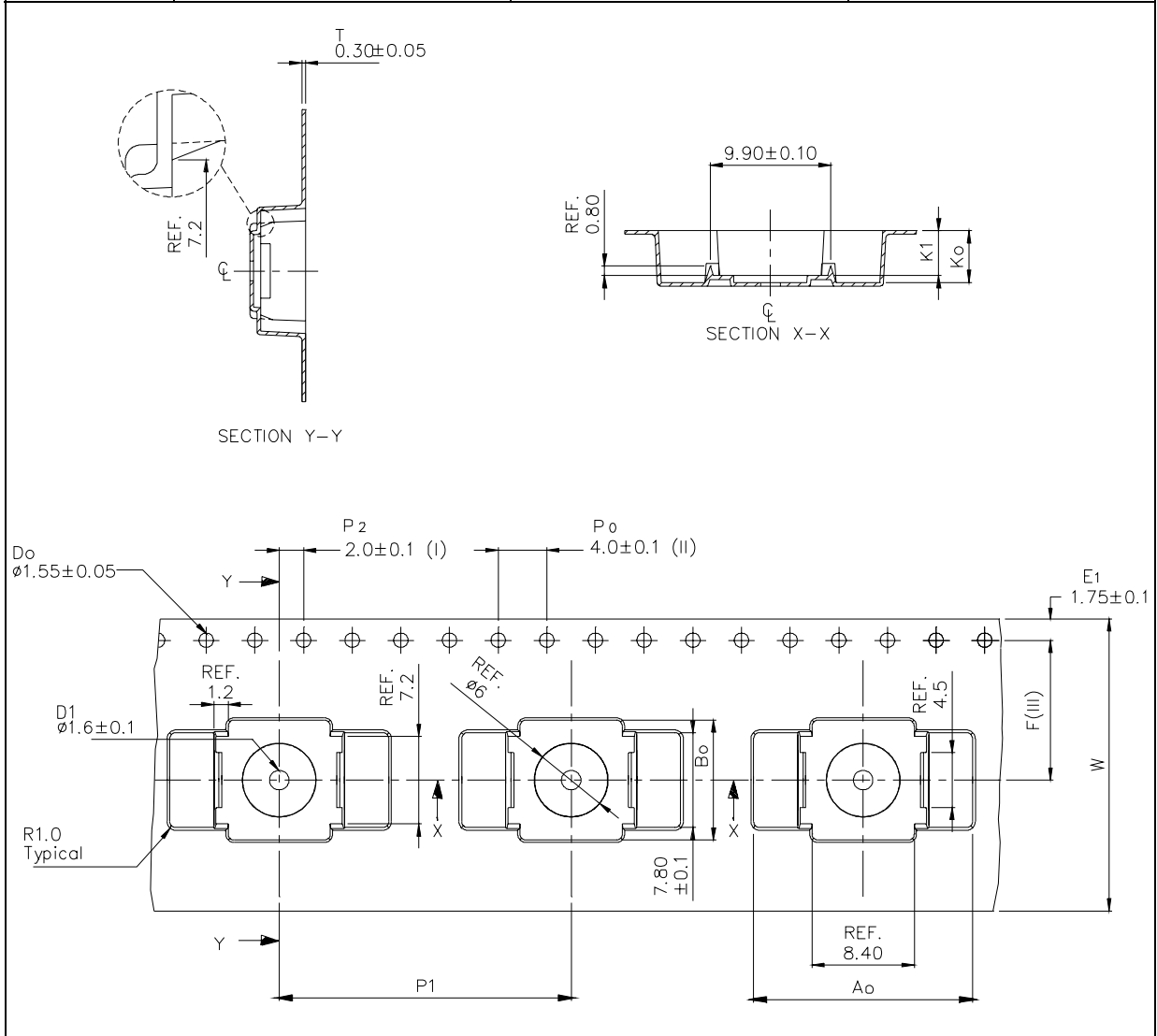


## TEST CIRCUIT PHOTOMASTER



TAPE & REEL DIMENSIONS

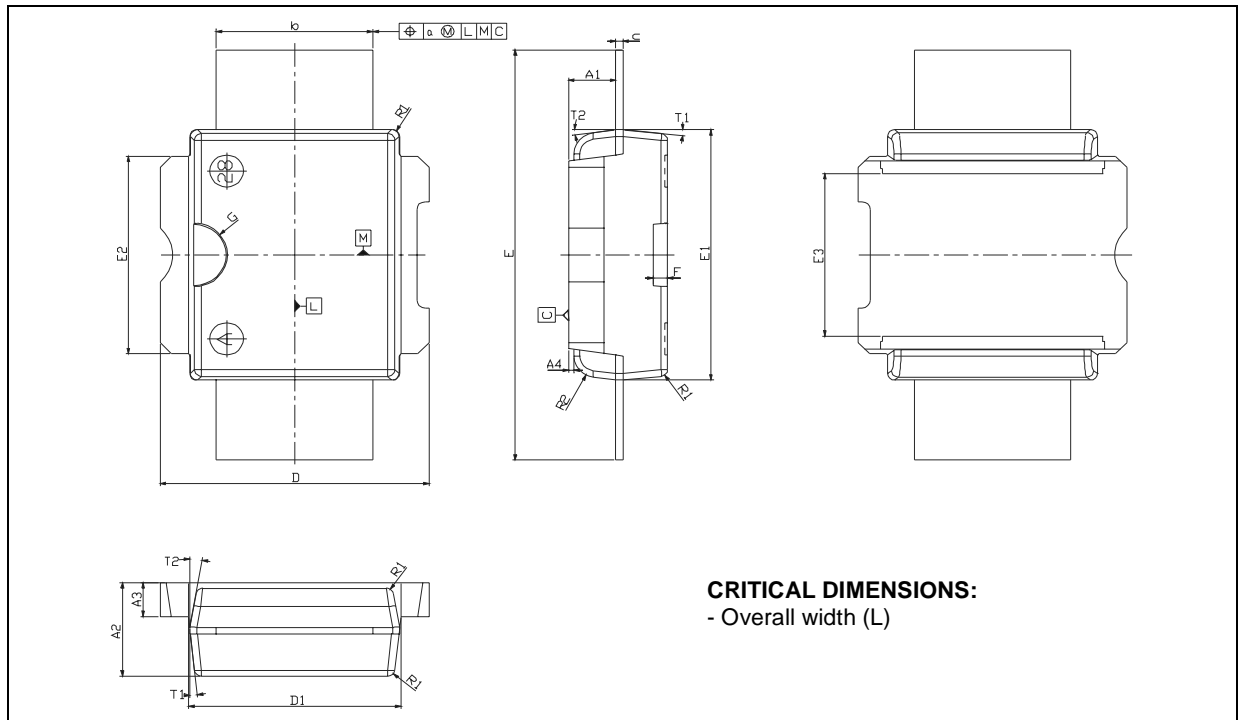
	mm		
	MIN.	TYP.	MAX
Ao	17.9	18.0	18.1
Bo	9.7	9.8	9.9
Ko	4.15	4.25	4.35
K1	3.6	3.7	3.8
F	11.4	11.5	11.6
P1	23.9	24.0	24.1
W	23.7	24.0	24.3



**PowerSO-10RF Straight Lead MECHANICAL DATA**

DIM.	mm			Inch		
	MIN.	TYP.	MAX	MIN.	TYP.	MAX
A1	1.62	1.67	1.72	0.064	0.065	0.068
A2	3.4	3.5	3.6	0.134	0.137	0.142
A3	1.2	1.3	1.4	0.046	0.05	0.054
A4	0.15	0.2	0.25	0.005	0.007	0.009
a		0.2			0.007	
b	5.4	5.53	5.65	0.212	0.217	0.221
c	0.23	0.27	0.32	0.008	0.01	0.012
D	9.4	9.5	9.6	0.370	0.374	0.377
D1	7.4	7.5	7.6	0.290	0.295	0.298
E	15.15	15.4	15.65	0.595	0.606	0.615
E1	9.3	9.4	9.5	0.365	0.37	0.375
E2	7.3	7.4	7.5	0.286	0.292	0.294
E3	5.9	6.1	6.3	0.231	0.24	0.247
F		0.5			0.019	
G		1.2			0.047	
R1			0.25			0.01
R2		0.8			0.031	
T1		6 deg			6 deg	
T2		10 deg			10 deg	

Note (1): Resin protrusions not included (max value: 0.15 mm per side)





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