INTEGRATED METAL-OXIDE SILICON L.F. PRE-AMPLIFIER

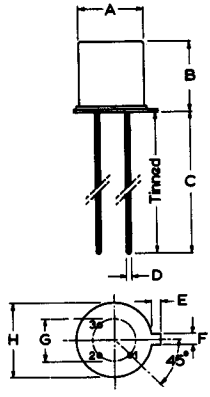
TAA320

The TAA320 is a semiconductor integrated circuit consisting of an M.O.S.T. input stage followed by a bi-polar transistor amplifier stage. This gives a very high input resistance and low transconductance which makes the TAA320 particularly suitable as a direct driver in audio amplifiers for use with crystal pick-ups. The TAA320 is also suitable for impedance converters, timing circuits, and other applications where a high input resistance is required.

QUICK REFERENCE DATA			
$-V_{DS}$ max.	Drain-to-source voltage	20	V
$-I_D$ max.	Drain current	25	mA
$-V_{GS}$ typ.	Gate-to-source voltage $-I_D = 10mA$, $-V_{DS} = 10V$	11	V
$\lvert y_{fs} \rvert$ typ.	Transfer admittance $-I_D = 10mA$, $-V_{DS} = 10V$	75	mmho
r_{gs} min.	Gate-to-source resistance $-V_{GS} < 20V$, $T_j < 125^oC$	100	GΩ

OUTLINE AND DIMENSIONS

Conforms to J.E.D.E.C. TO-18
B.S. 3934 SO-12A/SB3-6A



	Millimetres		
	Min.	Nom.	Max.
A	-	-	4.8
B	-	-	5.33
C	12.7	-	-
D	-	0.43	-
E	-	1.0	-
F	-	1.05	-
G	-	2.54	-
H	5.3	5.55	5.8

Pins:- 1. Drain 2. Gate 3. Source connected to case.

RATINGS

Limiting values of operation according to the absolute maximum system.

Electrical

$-V_{DSS}$	Drain-to-source voltage	20	V
$-V_{GSO}$	Gate-to-source voltage	20	V
$-V_{GSM}$	Non-repetitive peak gate-to-source voltage	100	V
$-I_D$	Drain current	25	mA
P_{tot}	Total power dissipation $T_{amb} \leq 25^oC$	200	mW

Temperature

T_{stg} min.	-65	^oC
T_{stg} max.	125	^oC
T_j max. (operating)	125	^oC

THERMAL CHARACTERISTIC

$\Theta_{j\text{-amb}}$	0.5	degC/mW

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^oC$ unless otherwise stated)

		Min.	Typ.	Max.	
$-I_{DS}$	Drain current $V_{DS} = 20V$, $V_{GS} = 0$	-	0.005	1.0	μA
$-V_{GS}$	Gate-to-source voltage $-I_D = 10mA$, $-V_{DS} = 10V$	9.0	11	14	V
r_{GS}	Gate-to-source resistance $-V_{GS}$ up to 20V, T_j up to 125°C	100	-	-	GΩ
v_n	Noise voltage $-I_D = 10mA$, $-V_{DS} = 10V$, f = 50Hz to 15kHz	-	25	-	μV

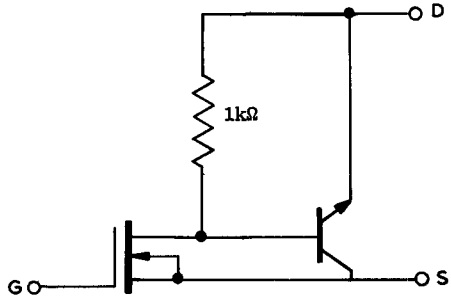
ELECTRICAL CHARACTERISTICS (cont'd)

		Min.	Typ.	Max.	
y-parameters at f = 1.0kHz, $-I_D$ = 10mA, $-V_{DS}$ = 10V					
$\|y_{fs}\|$	Transfer admittance	40	75	120	mmho
C_{is}	Input capacitance	-	8.0	-	pF
$-C_{rs}$	Feedback capacitance	-	1.5	-	pF
g_{os}	Output conductance	-	0.65	-	mmho

NOTE

To exclude the possibility of damage to the gate oxide layer by an electrostatic charge building up on the high resistance gate electrode, the leads of the device have been short-circuited by a clip. The clip has been arranged so that it need not be removed until the device has been mounted in the equipment or circuit

EQUIVALENT CIRCUIT



SOLDERING AND WIRING RECOMMENDATIONS

1. When using a soldering iron, devices may be soldered directly into the circuit, but heat conducted to the junction should if possible be kept to a minimum by the use of a thermal shunt.

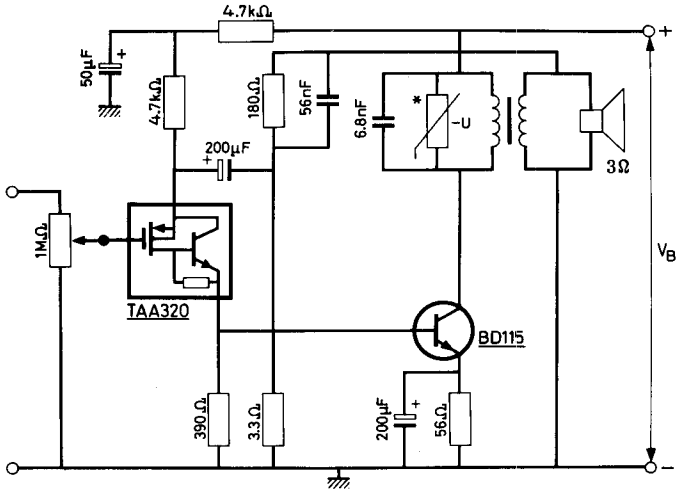
2. Devices may be dip-soldered at a solder temperature of 245°C for a maximum soldering time of 5 seconds. The case temperature during soldering must not at any time exceed the maximum storage temperature. These recommendations apply to a transistor mounted flush on a board having punched-through holes, or spaced at least 1.5mm above a board having plated-through holes.

3. Care should be taken not to bend the leads nearer than 1.5mm from the seal.

4. If devices are stored at temperatures above 100°C before incorporation into equipment, some deterioration of the external surface is likely to occur which may make soldering into the circuit difficult. Under these circumstances the leads should be retinned using a suitable activated flux.

APPLICATION INFORMATION

2W audio amplifier with TAA320 and BD115

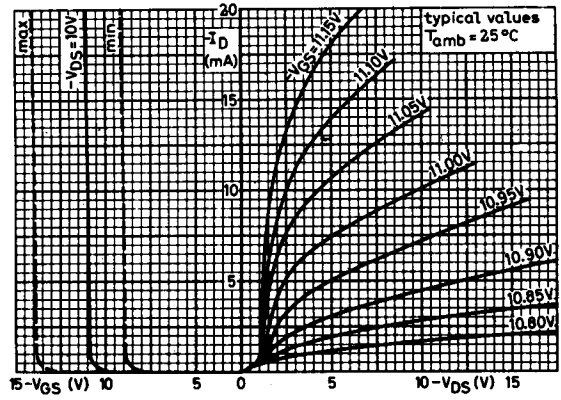


*The voltage dependent resistor E299DD/P338 suppresses voltage transients that might otherwise exceed the safe operating limits of the BD115.

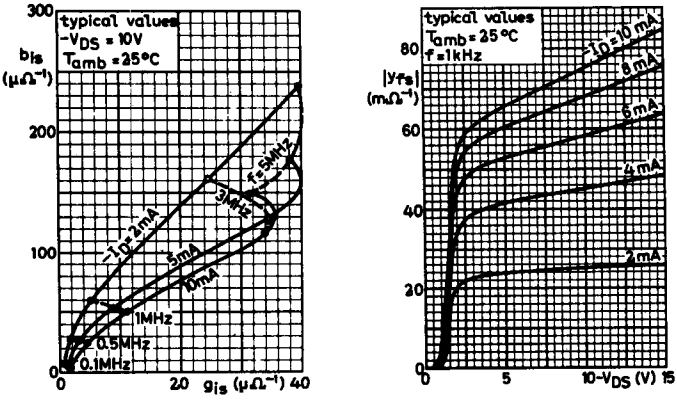
Supply voltage	V_B	100	V
Collector current of BD115 (typ.)	I_C	50	mA
Drain current of TAA320 (typ.)	$-I_D$	9.5	mA
Primary d.c. resistance of output transformer		140	Ω
Primary inductance of output transformer		2.7	H
A.C. collector load for BD115		1.8	kΩ
Turns ratio of output transformer		24.5:1	

Performance at f = 1kHz, feedback = 16dB

Output power at d_{tot} = 10% (typ.) (on primary of the output transformer)	P_o	2.6	W
Input voltage for P_o = 50mW (typ.)	$V_{i(rms)}$	13.5	mV
Input voltage for P_o = 2.0W (typ.)	$V_{i(rms)}$	86	mV
Total distortion at P_o = 2.0W (typ.)	d_{tot}	3.6	%
Minimum frequency response (-3dB)		60Hz to 20kHz	
Signal-to-noise ratio at P_o = 2.0W (typ.)		73	dB



GATE-TO-SOURCE AND DRAIN-TO-SOURCE VOLTAGE
PLOTTED AGAINST DRAIN CURRENT

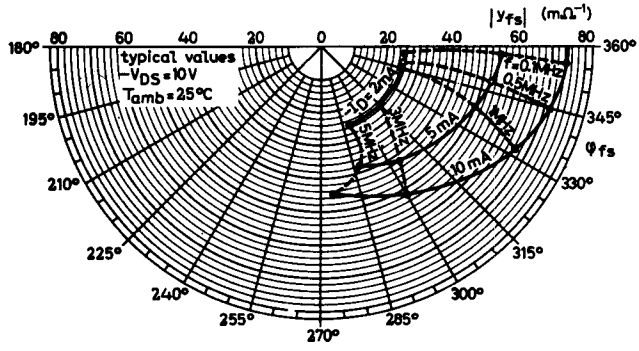


LEFT HAND CURVE

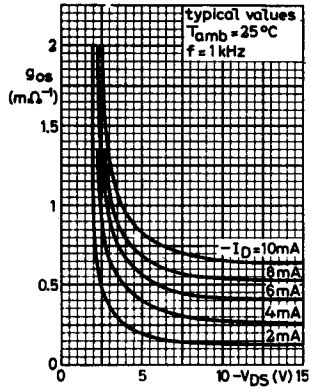
INPUT SUSCEPTANCE PLOTTED AGAINST INPUT CONDUCTANCE WITH DRAIN CURRENT AND FREQUENCY AS PARAMETERS

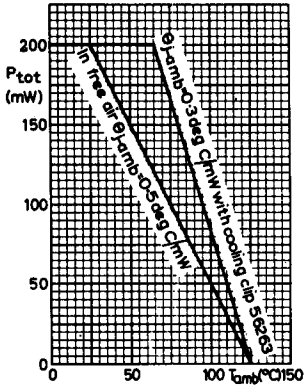
RIGHT HAND CURVE

TRANSFER ADMITTANCE PLOTTED AGAINST DRAIN-TO-SOURCE VOLTAGE WITH DRAIN CURRENT AS A PARAMETER



TRANSFER ADMITTANCE PLOTTED AGAINST PHASE ANGLE OF TRANSFER ADMITTANCE WITH DRAIN CURRENT AND FREQUENCY AS PARAMETERS



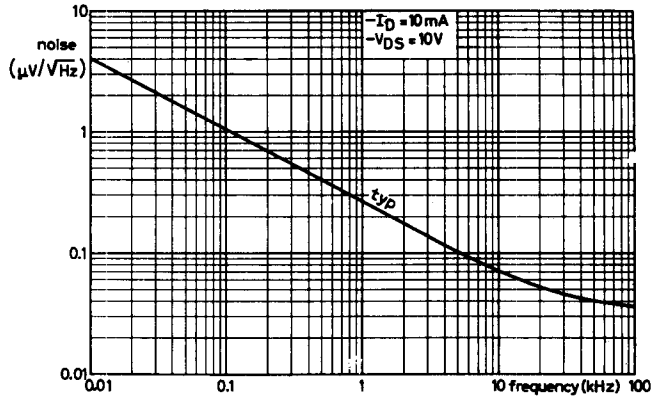


LEFT HAND CURVE

OUTPUT CONDUCTANCE PLOTTED AGAINST DRAIN-TO-SOURCE VOLTAGE WITH DRAIN CURRENT AS A PARAMETER

RIGHT HAND CURVE

TOTAL POWER DISSIPATION PLOTTED AGAINST AMBIENT TEMPERATURE UNDER FREE AIR AND COOLING CLIP CONDITIONS



SPOT NOISE FIGURE ($\mu V/\sqrt{Hz}$) PLOTTED AGAINST FREQUENCY