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DATA SHEET

J108; J109; J110
N-channel silicon junction FETs

Product specification
Supersedes data of April 1995
File under Discrete Semiconductors, SC07

1996 Jul 30

Philips
Semiconductors

PHILIPS

N-channel silicon junction FETs J108; J109; J110

FEATURES

- High speed switching
- Interchangeability of drain and source connections
- Low R_{DSon} at zero gate voltage (<8 Ω for J108).

APPLICATIONS

- Analog switches
- Choppers and commutators.

DESCRIPTION

N-channel symmetrical silicon junction field-effect transistors in a TO-92 package.

CAUTION
The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

PINNING - TO-92

PIN	SYMBOL	DESCRIPTION
1	g	gate
2	s	source
3	d	drain

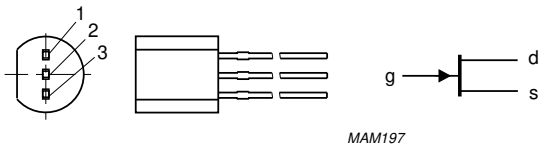


Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	±25	V
V_{GSoff}	gate-source cut-off voltage	I_D = 1 μA; V_{DS} = 5 V			
	J108		–3	–10	V
	J109		–2	–6	V
	J110		–0.5	–4	V
I_{DSS}	drain current	V_{GS} = 0; V_{DS} = 5 V			
	J108		80	–	mA
	J109		40	–	mA
	J110		10	–	mA
P_{tot}	total power dissipation	up to T_{amb} = 50 °C	–	400	mW

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	±25	V
V_{GSO}	gate-source voltage	open drain	–	–25	V
V_{GDO}	gate-drain voltage	open source	–	–25	V
I_G	forward gate current (DC)		–	50	mA
P_{tot}	total power dissipation	up to T_{amb} = 50 °C	–	400	mW
T_{stg}	storage temperature		–65	150	°C
T_j	operating junction temperature		–	150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	250	K/W

STATIC CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = –1 μA; V_{DS} = 0	–	–	–25	V
V_{GSoff}	gate-source cut-off voltage	I_D = 1 μA; V_{DS} = 5 V				V
	J108		–3	–	–10	V
	J109		–2	–	–6	V
	J110		–0.5	–	–4	V
I_{DSS}	drain current	V_{GS} = 0; V_{DS} = 15 V				
	J108		80	–	–	mA
	J109		40	–	–	mA
	J110		10	–	–	mA
I_{GSS}	gate leakage current	V_{GS} = –15 V; V_{DS} = 0	–	–	–3	nA
I_{DSX}	drain-source cut-off current	V_{GS} = –10 V; V_{DS} = 5 V	–	–	3	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 0; V_{DS} = 100 mV				
	J108		–	–	8	Ω
	J109		–	–	12	Ω
	J110		–	–	18	Ω

DYNAMIC CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
C_{is}	input capacitance	V_{DS} = 0; V_{GS} = −10 V; f = 1 MHz	15	30	pF
		V_{DS} = 0; V_{GS} = 0; f = 1 MHz; T_{amb} = 25 °C	50	85	pF
C_{rs}	reverse transfer capacitance	V_{DS} = 0; V_{GS} = −10 V; f = 1 MHz	8	15	pF
Switching times; see Fig.2					
t_d	delay time	note 1	2	–	ns
t_{on}	turn-on time		4	–	ns
t_s	storage time		4	–	ns
t_{off}	turn-off time		6	–	ns

Note

1. Test conditions for switching times are as follows:
   V_{DD} = 1.5 V; V_{GS} = 0 to V_{GSoff} (all types)
   V_{GSoff} = −12 V; R_L = 100 Ω (J108)
   V_{GSoff} = −7 V; R_L = 100 Ω (J109)
   V_{GSoff} = −5 V; R_L = 100 Ω (J110).

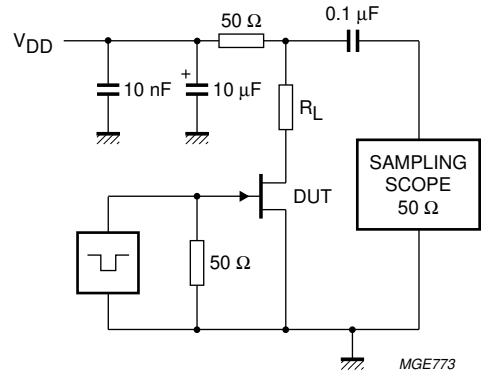


Fig.2 Switching circuit.

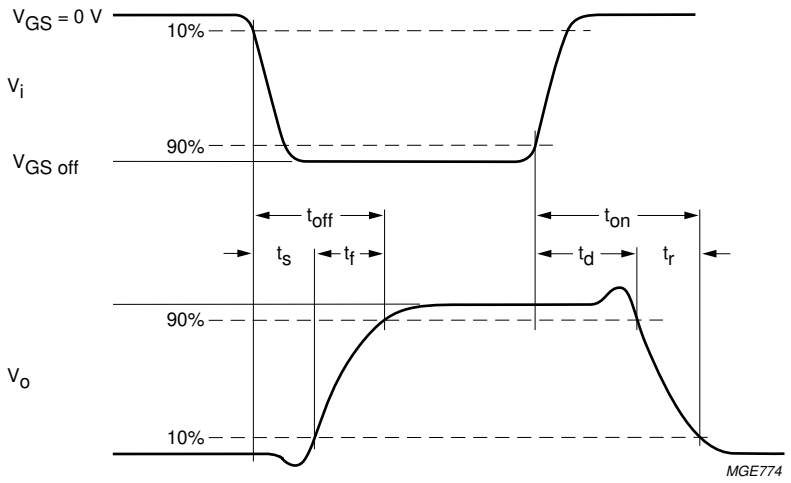
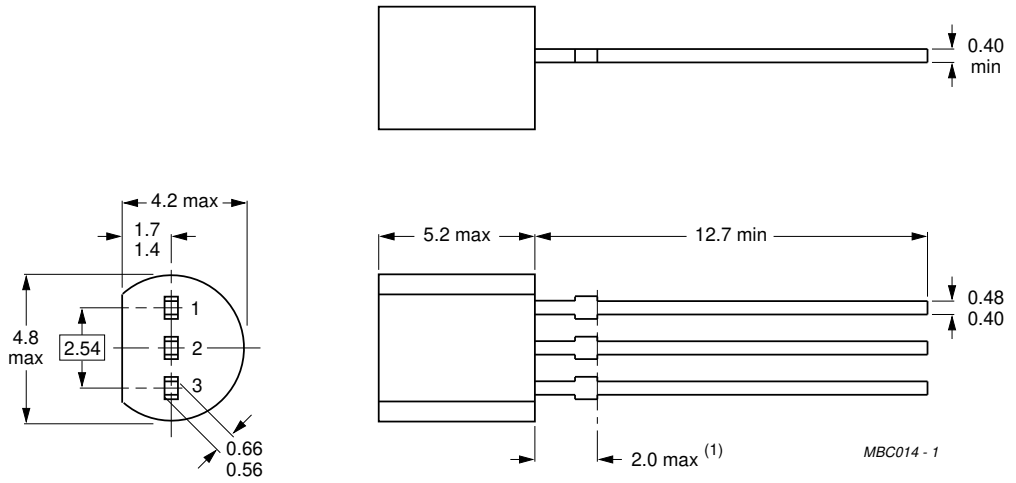


Fig.3 Input and output waveforms.

PACKAGE OUTLINE



Dimensions in mm.

(1) Terminal dimensions in this zone are uncontrolled.

Fig.4 TO-92 (SOT54).

DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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