

DATA SHEET

**J174; J175;
J176; J177
P-channel silicon field-effect
transistors**

Product specification
File under Discrete Semiconductors, SC07

April 1995

P-channel silicon field-effect transistors

J174; J175;
J176; J177

DESCRIPTION

Silicon symmetrical p-channel junction FETs in a plastic TO-92 envelope and intended for application with analog switches, choppers, commutators etc.

A special feature is the interchangeability of the drain and source connections.

PINNING

- 1 = source
- 2 = gate
- 3 = drain

Note: Drain and source are interchangeable.

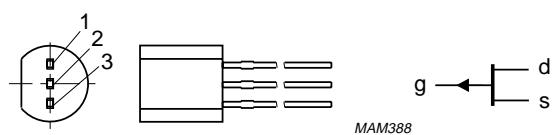


Fig.1 Simplified outline and symbol, TO-92.

QUICK REFERENCE DATA

Drain-source voltage	$\pm V_{DS}$	max.	30	V
Gate-source voltage	V_{GSO}	max.	30	V
Gate current	$-I_G$	max.	50	mA
Total power dissipation up to $T_{amb} = 50^\circ\text{C}$	P_{tot}	max.	400	mW
Drain current $-V_{DS} = 15\text{ V}; V_{GS} = 0$	$-I_{DSS}$	min. max.	20 135	J174 J175 J176 J177
				mA mA mA mA
Drain-source ON-resistance $-V_{DS} = 0.1\text{ V}; V_{GS} = 0$	$R_{DS\ on}$	max.	85	125 250 300 Ω

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Limiting values in accordance with the Absolute Maximum System (IEC 134)

Drain-source voltage	$\pm V_{DS}$	max.	30	V
Gate-source voltage	V_{GSO}	max.	30	V
Gate-drain voltage	V_{GDO}	max.	30	V
Gate current (DC)	$-I_G$	max.	50	mA
Total power dissipation up to $T_{amb} = 50^\circ\text{C}$	P_{tot}	max.	400	mW
Storage temperature range	T_{stg}		-65 to +150	$^\circ\text{C}$
Junction temperature	T_j	max.	150	$^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	250	K/W
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STATIC CHARACTERISTICS

$T_j = 25^\circ\text{C}$ unless otherwise specified		J174	J175	J176	J177
Gate cut-off current $V_{GS} = 20\text{ V}; V_{DS} = 0$	I_{GSS}	max.	1	1	1 1 nA
Drain cut-off current $-V_{DS} = 15\text{ V}; V_{GS} = 10\text{ V}$	$-I_{DSX}$	max.	1	1	1 1 nA
Drain current $-V_{DS} = 15\text{ V}; V_{GS} = 10\text{ V}$	$-I_{DSS}$	min. max.	20 135	7 70	2 35 1.5 mA 20 mA
Gate-source breakdown voltage $I_G = 1\ \mu\text{A}; V_{DS} = 0$	$V_{(BR)GSS}$	min.	30	30	30 30 V
Gate-source cut-off voltage $-I_D = 10\ \text{nA}; V_{DS} = -15\text{ V}$	$V_{GS\ off}$	min. max.	5 10	3 6	1 4 0.8 V 2.25 V
Drain-source ON-resistance $-V_{DS} = 0.1\text{ V}; V_{GS} = 0$	R_{DSon}	max.	85	125	250 300 Ω

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DYNAMIC CHARACTERISTICS

 $T_j = 25^\circ\text{C}$ unless otherwise specifiedInput capacitance, $f = 1\text{ MHz}$ $V_{GS} = 10\text{ V}; V_{DS} = 0\text{ V}$ $V_{GS} = V_{DS} = 0$ Feedback capacitance, $f = 1\text{ MHz}$ $V_{GS} = 10\text{ V}; V_{DS} = 0\text{ V}$

Switching times (see Fig.2 + 3)

Delay time

Rise time

Turn-on time

Storage time

Fall time

Turn-off time

Test conditions:

C_{is}	typ.	8			pF
C_{is}	typ.	30			pF
C_{rs}	typ.	4			pF
		J174	J175	J176	J177
t_d	typ.	2	5	15	20 ns
t_r	typ.	5	10	20	25 ns
t_{on}	typ.	7	15	35	45 ns
t_s	typ.	5	10	15	20 ns
t_f	typ.	10	20	20	25 ns
t_{off}	typ.	15	30	35	45 ns
$-V_{DD}$		10	6	6	6 V
$V_{GS\ off}$		12	8	6	3 V
R_L		560	1200	2000	2900 Ω
$V_{GS\ on}$		0	0	0	0 V

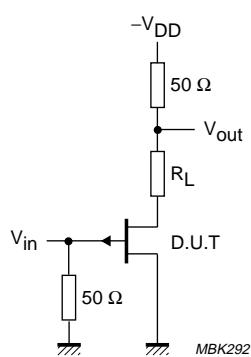
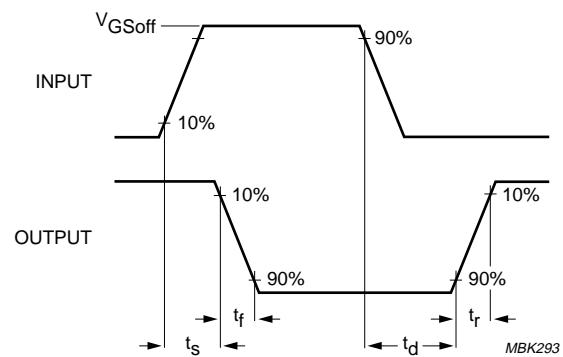


Fig.2 Switching times test circuit.

Fig.3 Input and output waveforms;
 $t_d + t_r = t_{on}$; $t_s + t_f = t_{off}$.

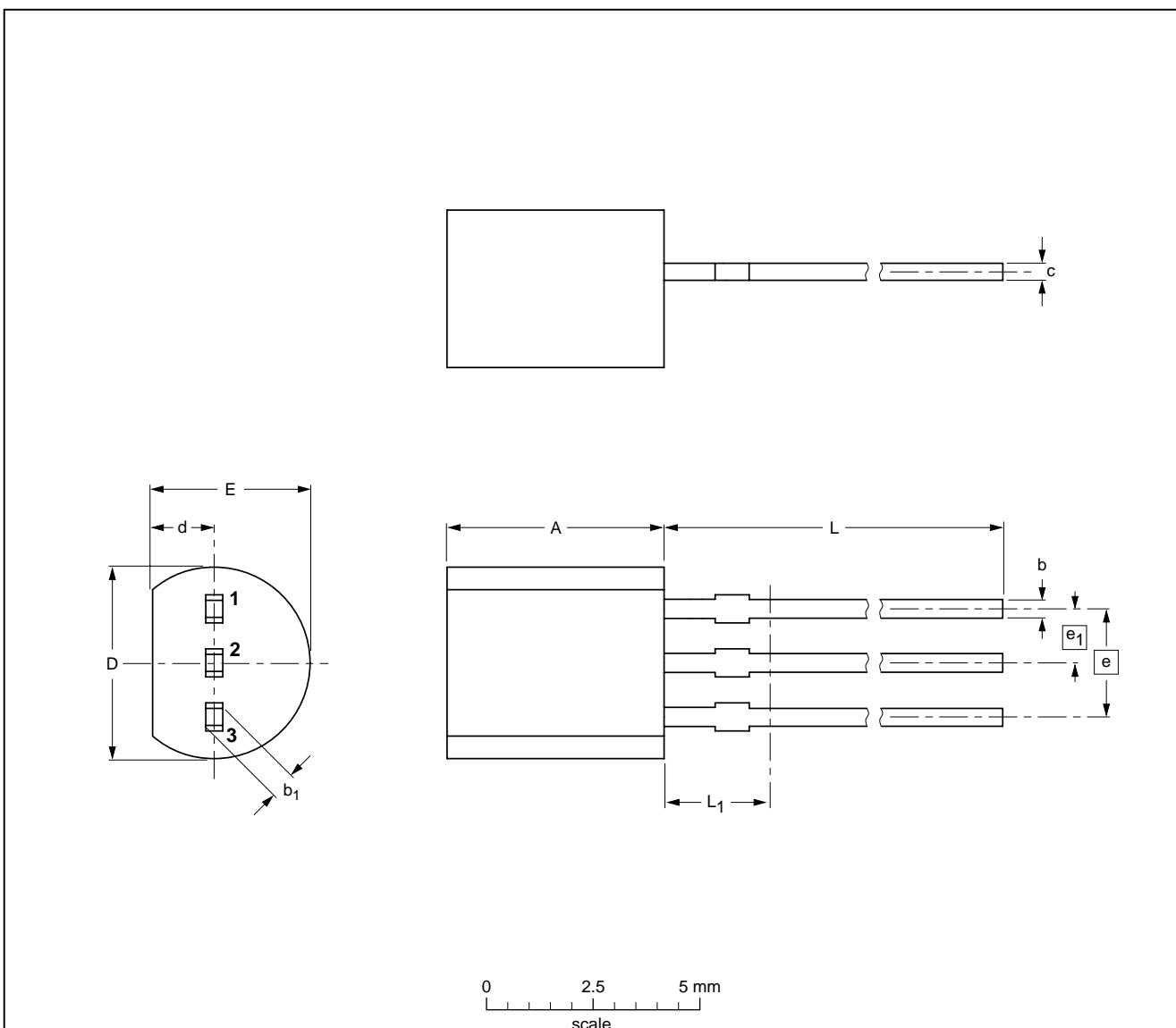
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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads

SOT54

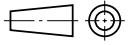


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b ₁	c	D	d	E	e	e ₁	L	L ₁ ⁽¹⁾
mm	5.2 5.0	0.48 0.40	0.66 0.56	0.45 0.40	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT54		TO-92	SC-43			97-02-28

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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.
Short-form specification	The data in this specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.
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.	

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