DATA SHEET

J174; J175; J176; J177

P-channel silicon field-effect transistors

Product specification
File under Discrete Semiconductors, SC07

April 1995

Philips Semiconductors

PHILIPS

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.

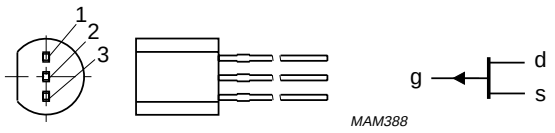


Fig.1 Simplified outline and symbol, TO-92.

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 °C	P_{tot}	max.		400			mW
			J174	**J175**	**J176**	**J177**	
Drain current $-V_{DS}$ = 15 V; V_{GS} = 0	$-I_{DSS}$	min.	20	7	2	1.5	mA
		max.	135	70	35	20	mA
Drain-source ON-resistance $-V_{DS}$ = 0.1 V; V_{GS} = 0	$R_{DS\ on}$	max.	85	125	250	300	Ω

RATINGS

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 °C	P_{tot}	max.	400	mW
Storage temperature range	T_{stg}		−65 to +150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

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

STATIC CHARACTERISTICS

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

DYNAMIC CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Input capacitance, f = 1 MHz							
V_{GS} = 10 V; V_{DS} = 0 V	C_{is}	typ.		8			pF
V_{GS} = V_{DS} = 0	C_{is}	typ.		30			pF
Feedback capacitance, f = 1 MHz							
V_{GS} = 10 V; V_{DS} = 0 V	C_{rs}	typ.		4			pF
Switching times (see Fig.2 + 3)			**J174**	**J175**	**J176**	**J177**	
Delay time	t_d	typ.	2	5	15	20	ns
Rise time	t_r	typ.	5	10	20	25	ns
Turn-on time	t_{on}	typ.	7	15	35	45	ns
Storage time	t_s	typ.	5	10	15	20	ns
Fall time	t_f	typ.	10	20	20	25	ns
Turn-off time	t_{off}	typ.	15	30	35	45	ns
Test conditions:	$-V_{DD}$		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

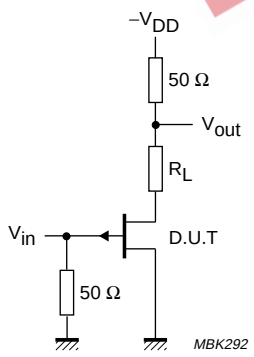


Fig.2 Switching times test circuit.

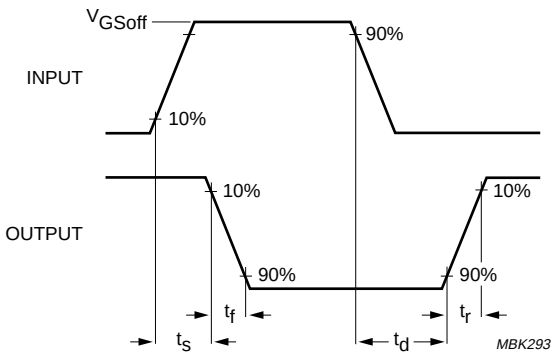
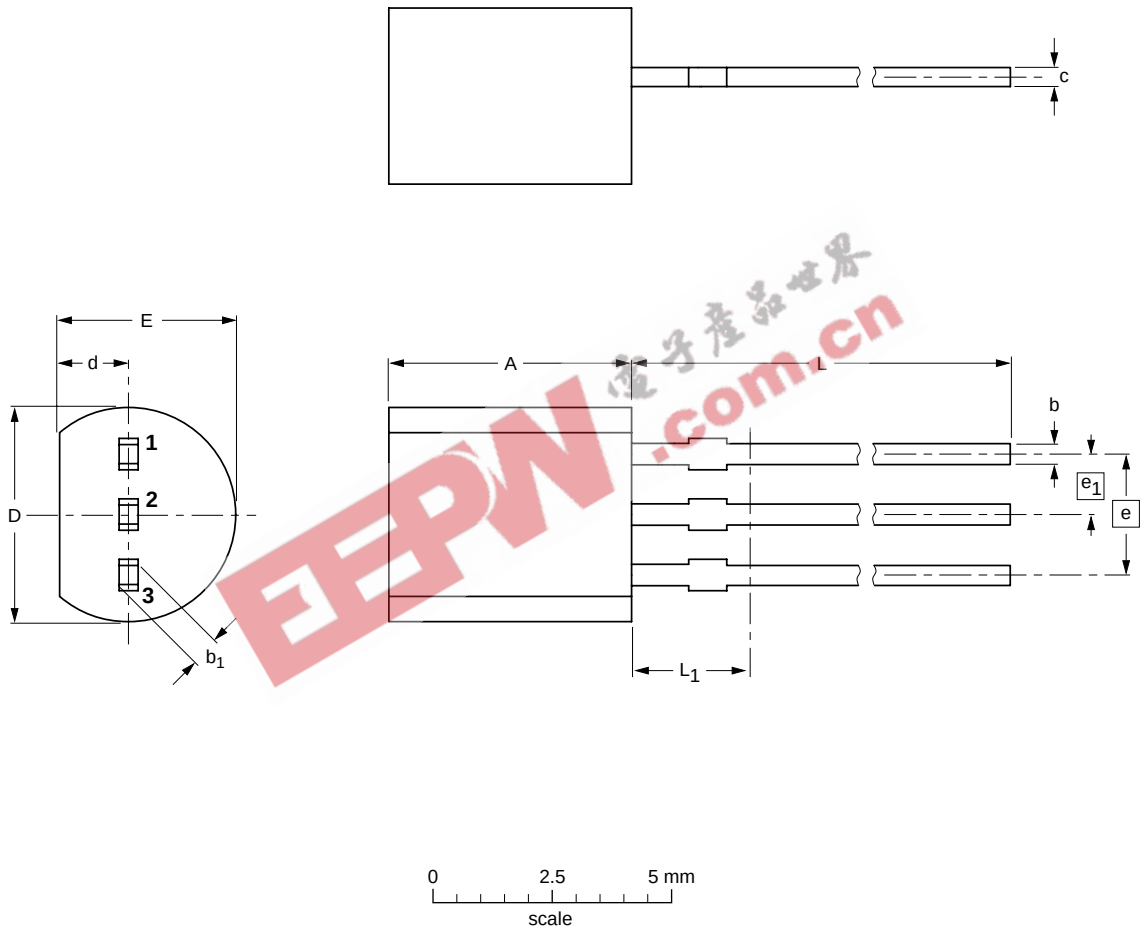


Fig.3 Input and output waveforms; $t_d + t_r = t_{on}$; $t_s + t_f = t_{off}$.

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

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.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.