

# DATA SHEET

## **J111; J112; J113** N-channel silicon field-effect transistors

Product specification  
File under Discrete Semiconductors, SC07

July 1993

# N-channel silicon field-effect transistors

# J111; J112; J113

### DESCRIPTION

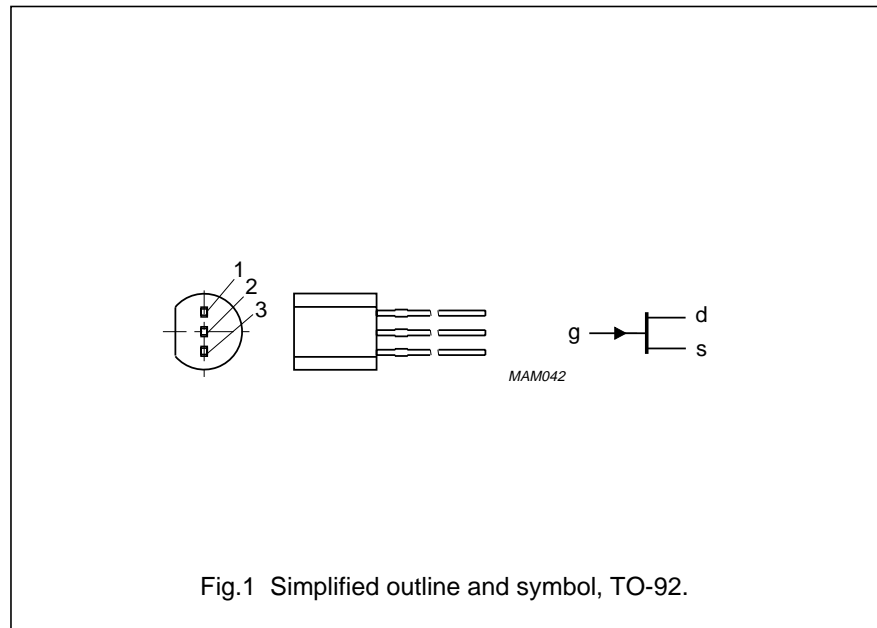
Symmetrical silicon n-channel junction FETs in plastic TO-92 envelopes. They are intended for applications such as analog switches, choppers, commutators etc.

### FEATURES

- High speed switching
- Interchangeability of drain and source connections
- Low  $R_{DS\ on}$  at zero gate voltage

### PINNING

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



Note: Drain and source are interchangeable.

### QUICK REFERENCE DATA

			J111	J112	J113	
Drain-source voltage	$\pm V_{DS}$	max.	40	40	40	V
Drain current						
$V_{DS} = 15\text{ V}; V_{GS} = 0$	$I_{DSS}$	min.	20	5	2	mA
Total power dissipation						
up to $T_{amb} = 50\text{ }^\circ\text{C}$	$P_{tot}$	max.	400	400	400	mW
Gate-source cut-off voltage						
$V_{DS} = 5\text{ V}; I_D = 1\text{ }\mu\text{A}$	$-V_{GS\ off}$	min.	3	1	0.5	V
		max.	10	5	3	V
Drain-source on-state resistance						
$V_{DS} = 0.1\text{ V}; V_{GS} = 0$	$R_{DS\ on}$	max.	30	50	100	$\Omega$

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**RATINGS**

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

Drain-source voltage	$\pm V_{DS}$	max.	40 V
Gate-source voltage	$-V_{GSO}$	max.	40 V
Gate-drain voltage	$-V_{GDO}$	max.	40 V
Gate forward current (DC)	$I_G$	max.	50 mA
Total power dissipation up to $T_{amb} = 50\text{ }^{\circ}\text{C}$	$P_{tot}$	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** $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified

			J111	J112	J113	
Gate reverse current $-V_{GS} = 15\text{ V}; V_{DS} = 0$	$-I_{GSS}$	max.	1	1	1	nA
Drain cut-off current $V_{DS} = 5\text{ V}; -V_{GS} = 10\text{ V}$	$-I_{DSX}$	max.	1	1	1	nA
Drain saturation current $V_{DS} = 15\text{ V}; V_{GS} = 0$	$I_{DSS}$	min.	20	5	2	mA
Gate-source breakdown voltage $-I_G = 1\text{ }\mu\text{A}; V_{DS} = 0$	$-V_{(BR)GSS}$	min.	40	40	40	V
Gate-source cut-off voltage $V_{DS} = 5\text{ V}; I_D = 1\text{ }\mu\text{A}$	$-V_{GS\ off}$	min. max.	3 10	1 5	0.5 3	V V
Drain-source on-state resistance $V_{DS} = 0.1\text{ V}; V_{GS} = 0$	$R_{DSon}$	max.	30	50	100	$\Omega$

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**DYNAMIC CHARACTERISTICS**

$T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified

Input capacitance

$V_{DS} = 0; -V_{GS} = 10\text{ V}; f = 1\text{ MHz}$

$C_{is}$  typ. 6 pF

$V_{DS} = -V_{GS} = 0; f = 1\text{ MHz}$

$C_{is}$  typ. 22 pF  
max. 28 pF

Feedback capacitance

$V_{DS} = 0; -V_{GS} = 10\text{ V}; f = 1\text{ MHz}$

$C_{rs}$  typ. 3 pF

Switching times

test conditions

$V_{DD} = 10\text{ V}; V_{GS} = 0\text{ to }V_{GSoff}$

$-V_{GSoff} = 12\text{ V}; R_L = 750\text{ }\Omega$  for J111

$-V_{GSoff} = 7\text{ V}; R_L = 1550\text{ }\Omega$  for J112

$-V_{GSoff} = 5\text{ V}; R_L = 3150\text{ }\Omega$  for J113

Rise time

$t_r$  typ. 6 ns

Turn-on time

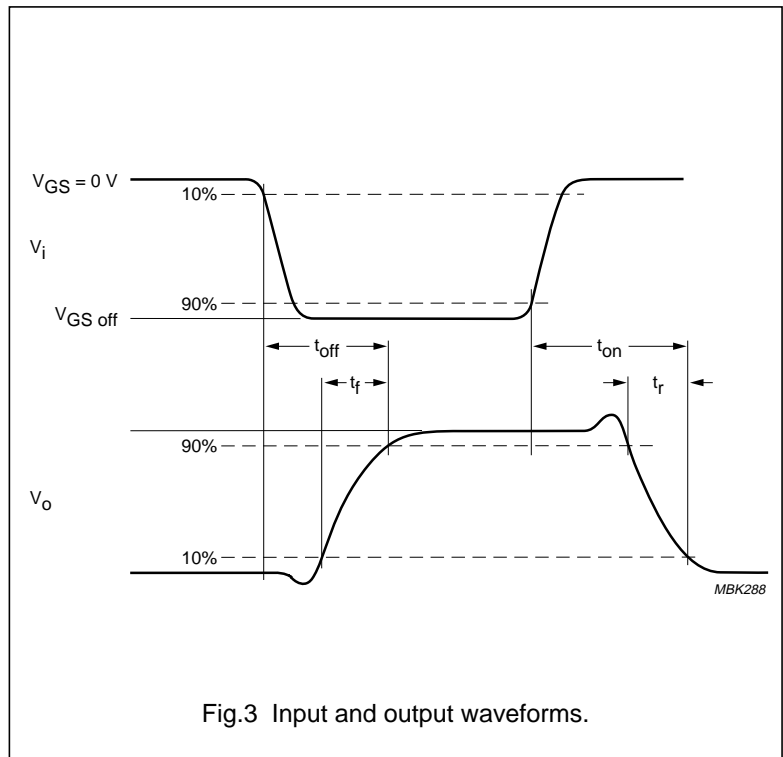
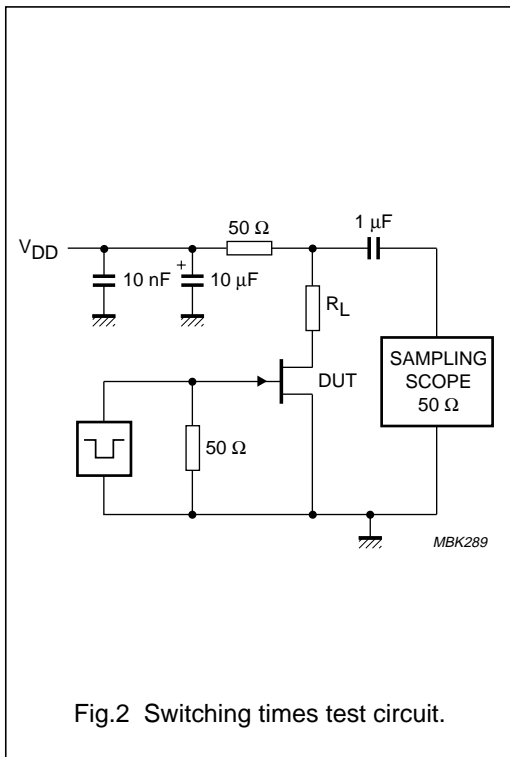
$t_{on}$  typ. 13 ns

Fall time

$t_f$  typ. 15 ns

Turn-off time

$t_{off}$  typ. 35 ns



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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 <sub>1</sub>	c	D	d	E	e	e <sub>1</sub>	L	L <sub>1</sub> <sup>(1)</sup>
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**

<b>Data sheet status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

**LIFE SUPPORT APPLICATIONS**

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