Siliconix incorporated

NCB SERIES DIE
N-Channel JFETs

T-35-25

The NCB Series features many of the superior characteristics of JFETs. Its low on-resistance and fast switching make it a good choice for demanding analog switching applications, while its high-gain, low-noise, and impressive frequency response make it the choice for specialized amplifier circuits. Die are supplied with 100% visual sort to criteria of MIL-STD-750C, Method 2072.

For additional design information please consult the typical performance curves NCB.

NCB1CHP*	NCB2CHP*	NCB3CHP*	NCB4CHP*
2N4391	2N4392	2N4858	2N4393
2N4856	2N4857	2N4858A	PN4393
2N4856A	2N4857A	2N4861	J113
2N4859	2N4860	2N4861A	SST4393
2N4859A	2N4860A		SST113
PN4391	PN4392		
J111	J112		
SST111	SST112		
SST4391	SST4392		

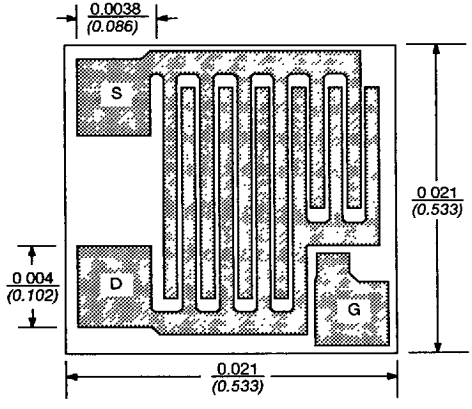
*Meets or exceeds specification for all part numbers listed below

DESIGNED FOR:

- Analog Switches
- Commutators
- Choppers
- Voltage Controlled Resistors
- Integrator Reset Switch

FEATURES

- High Speed t_{ON} < 20 ns
- High Off-Isolation $I_{D(OFF)}$ < 100 pA
- No Offset or Error Voltages Generated by Closed Switch. Purely Resistive. High Isolation Resistance from Driver



Gate also backside contact

Nominal Thickness
0.009 inches
0.228 mm

4

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS	SYMBOL	LIMITS	UNITS
Gate-Drain Voltage	V_{GD}	-40	V
Gate-Source Voltage	V_{GS}	-40	
Gate Current	I_G	50	mA
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	°C

NCB SERIES DIE

Siliconix incorporated

SPECIFICATIONS[a]				LIMITS					
					NCB1CHP		NCB2CHP		
PARAMETER	SYMBOL	TEST CONDITIONS		TYP[b]	MIN	MAX	MIN	MAX	UNIT
STATIC									
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	I_G = -1 µA, V_{DS} = 0 V		-55	-40		-40		V
Gate-Source Cutoff Voltage	$V_{GS(OFF)}$	V_{DS} = 20 V, I_D = 1 nA			-4	-10	-2	-5	
Saturation Drain Current[c]	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			50	150	25	75	mA
Gate Reverse Current	I_{GSS}	V_{GS} = -20 V, V_{DS} = 0 V		-5					pA
			T_A = 150°C	-13					nA
Gate Operating Current	I_G	V_{DG} = 15 V, I_D = 10 mA		-5					
Drain Cutoff Current	$I_{D(OFF)}$	V_{DS} = 20 V	V_{GS} = -5 V	5					pA
			V_{GS} = -7 V	5					
			V_{GS} = -12 V	5					
		V_{DS} = 20 V, T_A = 150°C	V_{GS} = -5 V	13					nA
			V_{GS} = -7 V	13					
			V_{GS} = -12 V	13					
Drain-Source On-Voltage	$V_{DS(ON)}$	V_{GS} = 0 V	I_D = 5 mA	0.25					V
			I_D = 6 mA	0.3					
			I_D = 12 mA	0.35					
Drain-Source On-Resistance	$r_{DS(ON)}$	V_{GS} = 0 V, I_D = 1 mA				25		40	Ω
Gate-Source Forward Voltage	$V_{GS(F)}$	I_G = 1 mA, V_{DS} = 0 V		0.7					V
DYNAMIC									
Common-Source Forward Transconductance	g_{fs}	V_{DG} = 20 V, I_D = 1 mA, f = 1 kHz		6					mS
Common-Source Output Conductance	g_{os}			25					µS
Drain-Source On-Resistance	$r_{ds(ON)}$	V_{GS} = 0 V, I_D = 0 V, f = 1 kHz				25		40	Ω
Common-Source Input Capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz		12					
Common-Source Reverse Transfer Capacitance	C_{rss}	V_{DS} = 0 V, f = 1 MHz	V_{GS} = -5 V	3.3					pF
			V_{GS} = -7 V	3.2					
			V_{GS} = -12 V	2.8					
Equivalent Input Noise Voltage	$\bar{e}_n$	V_{DG} = 10 V, I_D = 10 mA, f = 1 kHz		3.0					$nV/\sqrt{Hz}$
SWITCHING									
Turn-On Time	$t_{d(ON)}$	V_{DD} = 10 V, $V_{GS(ON)}$ = 0 V		2					ns
	t_r	P/N $I_{D(ON)}$ $V_{GS(OFF)}$ R_L		2					
Turn-Off Time	$t_{d(OFF)}$	NCB1CHP 12mA -12V 800Ω NCB2CHP 6mA -7V 1600Ω		6					
	t_f			19					

NOTES:
a. T_A = 25°C unless otherwise noted.
b. For design aid only, not subject to production testing.
c. Pulse test; PW = 300 µS, duty cycle ≤ 3%.

Siliconix incorporated

NCB SERIES DIE

SPECIFICATIONS[a]			LIMITS					
				NCB3CHP		NCB4CHP		
PARAMETER	SYMBOL	TEST CONDITIONS	TYP[b]	MIN	MAX	MIN	MAX	UNIT
STATIC								
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	I_G = −1 µA, V_{DS} = 0 V	−55	−40		−40		V
Gate-Source Cutoff Voltage	$V_{GS(OFF)}$	V_{DS} = 20 V, I_D = 1 nA		−0.8	−4	−0.5	−3	
Saturation Drain Current[c]	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V		8	80	5	30	mA
Gate Reverse Current	I_{GSS}	V_{GS} = −20 V, V_{DS} = 0 V	−5					pA
		T_A = 150°C	−13					nA
Gate Operating Current	I_G	V_{DG} = 15 V, I_D = 10 mA	−5					
Drain Cutoff Current	$I_{D(OFF)}$	V_{DS} = 20 V, V_{GS} = −5 V	5					pA
		V_{DS} = 20 V, V_{GS} = −7 V	5					
		V_{DS} = 20 V, V_{GS} = −12 V	5					
		V_{DS} = 20 V, T_A = 150°C, V_{GS} = −5 V	13					nA
		V_{DS} = 20 V, T_A = 150°C, V_{GS} = −7 V	13					
		V_{DS} = 20 V, T_A = 150°C, V_{GS} = −12 V	13					
Drain-Source On-Voltage	$V_{DS(ON)}$	V_{GS} = 0 V, I_D = 3 mA	0.25					V
		V_{GS} = 0 V, I_D = 5 mA	0.25					
		V_{GS} = 0 V, I_D = 12 mA	0.35					
Drain-Source On-Resistance	$r_{DS(ON)}$	V_{GS} = 0 V, I_D = 1 mA			60		100	Ω
Gate-Source Forward Voltage	$V_{GS(F)}$	I_G = 1 mA, V_{DS} = 0 V	0.7					V
DYNAMIC								
Common-Source Forward Transconductance	g_{fs}	V_{DG} = 20 V, I_D = 1 mA, f = 1 kHz	6					mS
Common-Source Output Conductance	g_{os}		25					µS
Drain-Source On-Resistance	$r_{ds(ON)}$	V_{GS} = 0 V, I_D = 0 V, f = 1 kHz			60		100	Ω
Common-Source Input Capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz	12					
Common-Source Reverse Transfer Capacitance	C_{rss}	V_{DS} = 0 V, f = 1 MHz, V_{GS} = −5 V	3.3					pF
		V_{DS} = 0 V, f = 1 MHz, V_{GS} = −7 V	3.2					
		V_{DS} = 0 V, f = 1 MHz, V_{GS} = −12 V	2.8					
Equivalent Input Noise Voltage	$\bar{e}_n$	V_{DG} = 10 V, I_D = 10 mA, f = 1 kHz	3.0					$nV/\sqrt{Hz}$
SWITCHING								
Turn-On Time	$t_{d(ON)}$	V_{DD} = 10 V, $V_{GS(ON)}$ = 0 V	2					ns
	t_r	P/N $I_{D(ON)}$ $V_{GS(OFF)}$ R_L	2					
Turn-Off Time	$t_{d(OFF)}$	NCB3CHP 5mA −7V 1910Ω NCB4CHP 3mA −5V 3000Ω	6					
	t_f		19					

NOTES:
a. T_A = 25°C unless otherwise noted.
b. For design aid only, not subject to production testing.
c. Pulse test, PW = 300 µS, duty cycle ≤ 3%

4