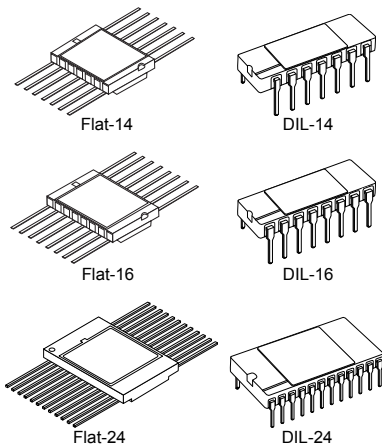


Rad-hard, high voltage, CMOS logic series



The upper metallic lid is not electrically connected to any pins, nor to the IC die inside the package

Features

- ESCC qualified
- 18 V Absolute maximum ratings
- 3 V to 15 V operating voltage
- Hermetic packages
- Rad-hard 100 krad (Si) TID
- SEL immune up to 119 MeV.cm²/mg
- SEU immune up to 119 MeV.cm²/mg
- -55 °C to +125 °C temperature range
- ESCC specification available on ESCC website for each part

Description

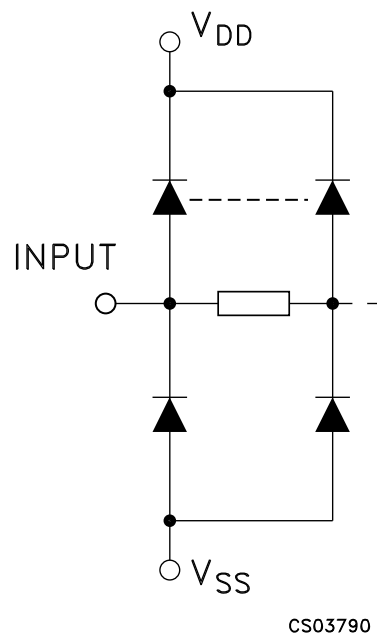
The HCC40xxx and HCC45xxx series are composed of high-voltage CMOS functions, offering a set of highly noise tolerant gates, Flip-Flops, multiplexers, counters, bus interfaces, and several other functions. The radiation hardness, single event latch-up (SEL), single event upset (SEU) immunity, and the housing in hermetic packages of all types of both series make them usable in the most difficult environmental conditions. They are all qualified and tested over -55 °C to +125 °C ambient temperature range. The complete specification of each type is available from the ESCC (European Space Components Coordination) web site: <https://escies.org> using its ESCC part number. STMicroelectronics® guarantees full compliance of qualified parts with these ESCC specifications.

Product status link

[HCC40xxx, HCC45xxx](#)

1 Input equivalent circuit diagram

Figure 1. Input equivalent circuit diagram



Note: For the HCC4019B and the HCC4050B input equivalent circuit, there is no diode connected to VCC.

2 Radiations

2.1 Total ionizing dose

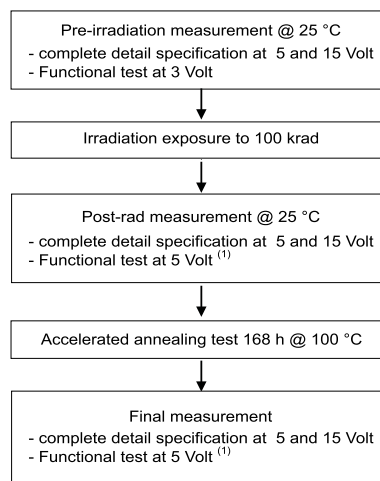
All the devices of the HCC series are 100 krad guaranteed as per the test methods described in Table 1. TID test conditions for the CMOS4000B family.

Table 1. TID test conditions for the CMOS4000B family

Test parameter	Test conditions
Total dose	100 krad(Si)
Dose rate	40 krad(Si)/h
Sampling	4 biased parts by wafer on 3 wafer per diffusion lot plus 1 control part to qualify the wafer lot. In case one wafer fails, qualification is done wafer per wafer on 4 biased parts
Bias conditions ⁽¹⁾	$V_{DD} = 10\text{ V}^{(2)}$ inputs at $V_{DD}^{(3)}$
Limits	V_{THN} , V_{THP} , I_{OL} , I_{OH} , T_{PHL} , T_{PLH} , V_{OL} , V_{OH} , V_N , V_P , V_H : see "ESCC detail specifications", limits $\pm 35\%$ for high and low limits
	Others tests performed as defined in "ESCC detail specification" with corresponding limits

1. During irradiation.
2. $V_{DD} = 10\text{ Volt}$ has been demonstrated to be the worst case condition during characterization.
3. Whenever functionally pertinent.

Figure 2. Irradiation test flow



1. The post rad guaranteed V_{cc} min. is therefore 5 V.

2.2 Single event effects (SEE)

The HCC logic series is characterized under heavy ions through four test vehicles, representative of all the products with the same functional specification as described in [Table 2. HCC series, SEE class summary](#). The SEE class of each product is also provided in [Table 2. HCC series, SEE class summary](#). The SEE performance of any HCC device of the series is the performance of the class it belongs to.

Table 2. HCC series, SEE class summary

Test vehicle	SEE class
HCC4014B	1
HCC4017B	2
HCC4093B	3
HCC4020B	4

The SEE performance of each SEE class is provided in [Table 3. SEE performance of SEE classes](#)

Table 3. SEE performance of SEE classes

Type	Class	Conditions	Result
SEL	1, 2, 3, 4	125 °C, $V_{CC}=20$ V, LET = 119 MeV.cm ² /mg, ion range = 20 μm, 45 ° tilt	No event
SEU	1	25 °C, LET = 61 MeV.cm ² /mg, $V_{CC}=5$ V, $V_{IN}=2.5$ V ± 2.5 V, $f_{IN}=50$ kHz, $f_{CLOCK}=500$ kHz, $V_{CC}=15$ V, $V_{IN}=7.5$ V ± 7.5 V, $f_{IN}=100$ kHz, $f_{CLOCK}=1$ MHz, ion range = 20 μm, 45 ° tilt	LETth> 60 MeV.cm ² /mg, σ sat = 8 x 10 ⁻⁶ cm ²
	2, 3	25 °C, LET = 119 MeV.cm ² /mg, $V_{CC}=5$ V, $V_{IN}=2.5$ V ± 2.5 V, $f_{IN}=50$ kHz, $f_{CLOCK}=500$ kHz, $V_{CC}=15$ V, $V_{IN}=7.5$ V ± 7.5 V, $f_{IN}=100$ kHz, $f_{CLOCK}=1$ MHz, ion range = 20 μm, 45 ° tilt	No event
	4	25 °C, LET = 36 MeV.cm ² /mg, $V_{CC}=5$ V, $V_{IN}=2.5$ V ± 2.5 V, $f_{IN}=50$ kHz, $f_{CLOCK}=500$ kHz, $V_{CC}=15$ V, $V_{IN}=7.5$ V ± 7.5 V, $f_{IN}=100$ kHz, $f_{CLOCK}=1$ MHz, ion range = 20 μm, 45 ° tilt	LETth> 36 MeV.cm ² /mg, σ sat = 1 x 10 ⁻⁴ cm ²
SET	1, 2, 3, 4	25 °C, LET = 119 MeV.cm ² /mg, Trigger = ± 50 mV $V_{CC}=5$ V, $V_{IN}=2.5$ V ± 2.5 V, $f_{IN}=50$ kHz, $V_{CC}=15$ V, $V_{IN}=7.5$ V ± 7.5 V, $f_{IN}=100$ kHz	No event

3 Ordering information

Table 4. Order codes

Product name	Description	Commercial Product ⁽¹⁾	ESCC specification	Quality level	Package ⁽²⁾	Lead finish	Marking ⁽³⁾	Mass (g)
HCC4001B	Rad-hard quad 2-input NOR gate	HCC4001BDG	920104103	ESCC Flight	DIL14 FP	Gold	920104103	2.20
		HCC4001BDT	920104104	ESCC Flight	DIL14 FP	Solder Dip	920104104	2.20
		HCC4001BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4001BK1	0.70
		HCC4001BKG	920104101	ESCC Flight	FLAT14 ESA FP	Gold	920104101	0.70
		HCC4001BKT	920104102	ESCC Flight	FLAT14 ESA FP	Solder Dip	920104102	0.70
HCC4002B	Rad-hard dual 4-input NOR gate	HCC4002BDG	920104203	ESCC Flight	DIL14 FP	Gold	920104203	2.20
		HCC4002BDT	920104204	ESCC Flight	DIL14 FP	Solder Dip	920104204	2.20
		HCC4002BKG	920104201	ESCC Flight	FLAT14 ESA FP	Gold	920104201	0.70
		HCC4002BKT	920104202	ESCC Flight	FLAT14 ESA FP	Solder Dip	920104202	0.70
HCC40106B	Rad-hard hex Schmitt trigger	HCC40106BDG	940900503	ESCC Flight	DIL14 FP	Gold	940900503	2.20
		HCC40106BDT	940900504	ESCC Flight	DIL14 FP	Solder Dip	940900504	2.20
		HCC40106BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC40106BK1	0.70
		HCC40106BKG	940900501	ESCC Flight	FLAT14 ESA FP	Gold	940900501	0.70
		HCC40106BKT	940900502	ESCC Flight	FLAT14 ESA FP	Solder Dip	940900502	0.70
HCC40109B	Rad-hard quad low-to-high voltage level shifter	HCC40109BDG	940700308	ESCC Flight	DIL16 FP	Gold	940700308	2.20
		HCC40109BDT	940700309	ESCC Flight	DIL16 FP	Solder Dip	940700309	2.20
		HCC40109BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC40109BK1	0.70
		HCC40109BKG	940700301	ESCC Flight	FLAT16 ESA FP	Gold	940700301	0.70
		HCC40109BKT	940700302	ESCC Flight	FLAT16 ESA FP	Solder Dip	940700302	0.70
HCC4011B	Rad-hard quad 2-input NAND gate	HCC4011BDG	920104303	ESCC Flight	DIL14 FP	Gold	920104303	2.20
		HCC4011BDT	920104304	ESCC Flight	DIL14 FP	Solder Dip	920104304	2.20
		HCC4011BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4011BK1	0.70
		HCC4011BKG	920104301	ESCC Flight	FLAT14 ESA FP	Gold	920104301	0.70
		HCC4011BKT	920104302	ESCC Flight	FLAT14 ESA FP	Solder Dip	920104302	0.70

Product name	Description	Commercial Product ⁽¹⁾	ESCC specification	Quality level	Package ⁽²⁾	Lead finish	Marking ⁽³⁾	Mass (g)
HCC4013B	Rad-hard dual D flip-flop	HCC4013BDG	920302303	ESCC Flight	DIL14 FP	Gold	920302303	2.20
		HCC4013BDT	920302304	ESCC Flight	DIL14 FP	Solder Dip	920302304	2.20
		HCC4013BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4013BK1	0.70
		HCC4013BKG	920302301	ESCC Flight	FLAT14 ESA FP	Gold	920302301	0.70
		HCC4013BKT	920302302	ESCC Flight	FLAT14 ESA FP	Solder Dip	920302302	0.70
HCC4014B	Rad-hard 8-stage Static synchronous shift register	HCC4014BDG	930601408	ESCC Flight	DIL16 FP	Gold	930601408	2.20
		HCC4014BDT	930601409	ESCC Flight	DIL16 FP	Solder Dip	930601409	2.20
		HCC4014BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4014BK1	0.70
		HCC4014BKG	930601401	ESCC Flight	FLAT16 ESA FP	Gold	930601401	0.70
		HCC4014BKT	930601402	ESCC Flight	FLAT16 ESA FP	Solder Dip	930601402	0.70
HCC4015B	Rad-hard dual 4-stage Static shift register	HCC4015BDG	930601508	ESCC Flight	DIL16 FP	Gold	930601508	2.20
		HCC4015BDT	930601509	ESCC Flight	DIL16 FP	Solder Dip	930601509	2.20
		HCC4015BKG	930601501	ESCC Flight	FLAT16 ESA FP	Gold	930601501	0.70
		HCC4015BKT	930601502	ESCC Flight	FLAT16 ESA FP	Solder Dip	930601502	0.70
HCC4019B	Rad-hard quad AND/OR select gate	HCC4019BDG	920205108	ESCC Flight	DIL16 FP	Gold	920205108	2.20
		HCC4019BDT	920205109	ESCC Flight	DIL16 FP	Solder Dip	920205109	2.20
		HCC4019BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4019BK1	0.70
		HCC4019BKG	920205101	ESCC Flight	FLAT16 ESA FP	Gold	920205101	0.70
		HCC4019BKT	920205102	ESCC Flight	FLAT16 ESA FP	Solder Dip	920205102	0.70
HCC4020B	Rad-hard 14-stage binary/ripple counter	HCC4020BDG	920402208	ESCC Flight	DIL16 FP	Gold	920402208	2.20
		HCC4020BDT	920402209	ESCC Flight	DIL16 FP	Solder Dip	920402209	2.20
		HCC4020BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4020BK1	0.70
		HCC4020BKG	920402201	ESCC Flight	FLAT16 ESA FP	Gold	920402201	0.70
		HCC4020BKT	920402202	ESCC Flight	FLAT16 ESA FP	Solder Dip	920402202	0.70
HCC4021B	Rad-hard 8-stage Static shift register	HCC4021BDG	930601608	ESCC Flight	DIL16 FP	Gold	930601608	2.20
		HCC4021BDT	930601609	ESCC Flight	DIL16 FP	Solder Dip	930601609	2.20
		HCC4021BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4021BK1	0.70

Product name	Description	Commercial Product ⁽¹⁾	ESCC specification	Quality level	Package ⁽²⁾	Lead finish	Marking ⁽³⁾	Mass (g)
HCC4021B	Rad-hard 8-stage Static shift register	HCC4021BKG	930601601	ESCC Flight	FLAT16 ESA FP	Gold	930601601	0.70
		HCC4021BKT	930601602	ESCC Flight	FLAT16 ESA FP	Solder Dip	930601602	0.70
HCC4022B	Rad-hard Divide-By-8 counter / divider	HCC4022BDG	920402308	ESCC Flight	DIL16 FP	Gold	920402308	2.20
		HCC4022BDT	920402309	ESCC Flight	DIL16 FP	Solder Dip	920402309	2.20
		HCC4022BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4022BK1	0.70
		HCC4022BKG	920402301	ESCC Flight	FLAT16 ESA FP	Gold	920402301	0.70
		HCC4022BKT	920402302	ESCC Flight	FLAT16 ESA FP	Solder Dip	920402302	0.70
HCC4024B	Rad-hard 7-stage binary/ripple counter	HCC4024BDG	920402403	ESCC Flight	DIL14 FP	Gold	920402403	2.20
		HCC4024BDT	920402404	ESCC Flight	DIL14 FP	Solder Dip	920402404	2.20
		HCC4024BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4024BK1	0.70
		HCC4024BKG	920402401	ESCC Flight	FLAT14 ESA FP	Gold	920402401	0.70
		HCC4024BKT	920402402	ESCC Flight	FLAT14 ESA FP	Solder Dip	920402402	0.70
HCC4027B	Rad-hard dual J-K master-slave flip-flop	HCC4027BDG	920302208	ESCC Flight	DIL16 FP	Gold	920302208	2.20
		HCC4027BDT	920302209	ESCC Flight	DIL16 FP	Solder Dip	920302209	2.20
		HCC4027BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4027BK1	0.70
		HCC4027BKG	920302201	ESCC Flight	FLAT16 ESA FP	Gold	920302201	0.70
		HCC4027BKT	920302202	ESCC Flight	FLAT16 ESA FP	Solder Dip	920302202	0.70
HCC4028B	Rad-hard BCD-to-decimal decoder	HCC4028BDG	920501008	ESCC Flight	DIL16 FP	Gold	920501008	2.20
		HCC4028BDT	920501009	ESCC Flight	DIL16 FP	Solder Dip	920501009	2.20
		HCC4028BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4028BK1	0.70
		HCC4028BKG	920501001	ESCC Flight	FLAT16 ESA FP	Gold	920501001	0.70
		HCC4028BKT	920501002	ESCC Flight	FLAT16 ESA FP	Solder Dip	920501002	0.70
HCC4029B	Rad-hard presettable up / down counter	HCC4029BDG	920402508	ESCC Flight	DIL16 FP	Gold	920402508	2.20
		HCC4029BDT	920402509	ESCC Flight	DIL16 FP	Solder Dip	920402509	2.20
		HCC4029BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4029BK1	0.70
		HCC4029BKG	920402501	ESCC Flight	FLAT16 ESA FP	Gold	920402501	0.70



Product name	Description	Commercial Product ⁽¹⁾	ESCC specification	Quality level	Package ⁽²⁾	Lead finish	Marking ⁽³⁾	Mass (g)
HCC4029B	Rad-hard presettable up / down counter	HCC4029BKT	920402502	ESCC Flight	FLAT16 ESA FP	Solder Dip	920402502	0.70
HCC4040B	Rad-hard 12-stage binary/Ripple counter	HCC4040BDG	920402608	ESCC Flight	DIL16 FP	Gold	920402608	2.20
		HCC4040BDT	920402609	ESCC Flight	DIL16 FP	Solder Dip	920402609	2.20
		HCC4040BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4040BK1	0.70
		HCC4040BKG	920402601	ESCC Flight	FLAT16 ESA FP	Gold	920402601	0.70
		HCC4040BKT	920402602	ESCC Flight	FLAT16 ESA FP	Solder Dip	920402602	0.70
HCC4046B	Rad-hard micropower Phase locker Loop	HCC4046BDG	920204408	ESCC Flight	DIL16 FP	Gold	920204408	2.20
		HCC4046BDT	920204409	ESCC Flight	DIL16 FP	Solder Dip	920204409	2.20
		HCC4046BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4046BK1	0.70
		HCC4046BKG	920204401	ESCC Flight	FLAT16 ESA FP	Gold	920204401	0.70
		HCC4046BKT	920204402	ESCC Flight	FLAT16 ESA FP	Solder Dip	920204402	0.70
HCC4047B	Rad-hard monostable/Astable multivibrator	HCC4047BDG	920700303	ESCC Flight	DIL14 FP	Gold	920700303	2.20
		HCC4047BDT	920700304	ESCC Flight	DIL14 FP	Solder Dip	920700304	2.20
		HCC4047BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4047BK1	0.70
		HCC4047BKG	920700301	ESCC Flight	FLAT14 ESA FP	Gold	920700301	0.70
		HCC4047BKT	920700302	ESCC Flight	FLAT14 ESA FP	Solder Dip	920700302	0.70
HCC4050B	Rad-hard hex non-inverting buffer / converter	HCC4050BDG	920204608	ESCC Flight	DIL16 FP	Gold	920204608	2.20
		HCC4050BDT	920204609	ESCC Flight	DIL16 FP	Solder Dip	920204609	2.20
		HCC4050BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4050BK1	0.70
		HCC4050BKG	920204601	ESCC Flight	FLAT16 ESA FP	Gold	920204601	0.70
		HCC4050BKT	920204602	ESCC Flight	FLAT16 ESA FP	Solder Dip	920204602	0.70
HCC4051B	Rad-hard single 8-channel analog mux / demux	HCC4051BDG	920204708	ESCC Flight	DIL16 FP	Gold	920204708	2.20
		HCC4051BDT	920204709	ESCC Flight	DIL16 FP	Solder Dip	920204709	2.20
		HCC4051BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4051BK1	0.70
		HCC4051BKG	920204701	ESCC Flight	FLAT16 ESA FP	Gold	920204701	0.70
		HCC4051BKT	920204702	ESCC Flight	FLAT16 ESA FP	Solder Dip	920204702	0.70

Product name	Description	Commercial Product ⁽¹⁾	ESCC specification	Quality level	Package ⁽²⁾	Lead finish	Marking ⁽³⁾	Mass (g)
HCC4052B	Rad-hard differential 4-channel analog mux / demux	HCC4052BDG	920204808	ESCC Flight	DIL16 FP	Gold	920204808	2.20
		HCC4052BDT	920204809	ESCC Flight	DIL16 FP	Solder Dip	920204809	2.20
		HCC4052BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4052BK1	0.70
		HCC4052BKG	920204801	ESCC Flight	FLAT16 ESA FP	Gold	920204801	0.70
		HCC4052BKT	920204802	ESCC Flight	FLAT16 ESA FP	Solder Dip	920204802	0.70
HCC4053B	Rad-hard triple 2-channel analog mux / demux	HCC4053BDG	920204908	ESCC Flight	DIL16 FP	Gold	920204908	2.20
		HCC4053BDT	920204909	ESCC Flight	DIL16 FP	Solder Dip	920204909	2.20
		HCC4053BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4053BK1	0.70
		HCC4053BKG	920204901	ESCC Flight	FLAT16 ESA FP	Gold	920204901	0.70
		HCC4053BKT	920204902	ESCC Flight	FLAT16 ESA FP	Solder Dip	920204902	0.70
HCC4060B	Rad-hard 14-stage counter / divider and oscillator	HCC4060BDG	920405208	ESCC Flight	DIL16 FP	Gold	920405208	2.20
		HCC4060BKG	920405201	ESCC Flight	FLAT16 ESA FP	Gold	920405201	0.70
HCC4066B	Rad-hard quad bilateral switch	HCC4066BDG	940800503	ESCC Flight	DIL14 FP	Gold	940800503	2.20
		HCC4066BDT	940800504	ESCC Flight	DIL14 FP	Solder Dip	940800504	2.20
		HCC4066BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4066BK1	0.70
		HCC4066BKG	940800501	ESCC Flight	FLAT14 ESA FP	Gold	940800501	0.70
		HCC4066BKT	940800502	ESCC Flight	FLAT14 ESA FP	Solder Dip	940800502	0.70
HCC4067B	Rad-hard single 16-channel analog mux / demux	HCC4067BDG	940800903	ESCC Flight	DIL24 large FP	Gold	940800903	5.20
		HCC4067BDT	940800904	ESCC Flight	DIL24 large FP	Solder Dip	940800904	5.20
		HCC4067BK1	-	Engineering Model	FLAT24 EM	Gold	HCC4067BK1	1.70
		HCC4067BKG	940800901	ESCC Flight	FLAT24 FP	Gold	940800901	1.70
		HCC4067BKT	940800902	ESCC Flight	FLAT24 FP	Solder Dip	940800902	1.70
HCC4070B	Rad-hard quad exclusive OR gate	HCC4070BDG	920104803	ESCC Flight	DIL14 FP	Gold	920104803	2.20
		HCC4070BDT	920104804	ESCC Flight	DIL14 FP	Solder Dip	920104804	2.20
		HCC4070BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4070BK1	0.70
		HCC4070BKG	920104801	ESCC Flight	FLAT14 ESA FP	Gold	920104801	0.70
		HCC4070BKT	920104802	ESCC Flight	FLAT14 ESA FP	Solder Dip	920104802	0.70

Product name	Description	Commercial Product ⁽¹⁾	ESCC specification	Quality level	Package ⁽²⁾	Lead finish	Marking ⁽³⁾	Mass (g)
HCC4071B	Rad-hard quad 2-input OR gate	HCC4071BDG	920106303	ESCC Flight	DIL14 FP	Gold	920106303	2.20
		HCC4071BDT	920106304	ESCC Flight	DIL14 FP	Solder Dip	920106304	2.20
		HCC4071BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4071BK1	0.70
		HCC4071BKG	920106301	ESCC Flight	FLAT14 ESA FP	Gold	920106301	0.70
		HCC4071BKT	920106302	ESCC Flight	FLAT14 ESA FP	Solder Dip	920106302	0.70
HCC4073B	Rad-hard triple 3-input AND gate	HCC4073BDG	920106403	ESCC Flight	DIL14 FP	Gold	920106403	2.20
		HCC4073BDT	920106404	ESCC Flight	DIL14 FP	Solder Dip	920106404	2.20
		HCC4073BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4073BK1	0.70
		HCC4073BKG	920106401	ESCC Flight	FLAT14 ESA FP	Gold	920106401	0.70
		HCC4073BKT	920106402	ESCC Flight	FLAT14 ESA FP	Solder Dip	920106402	0.70
HCC4077B	Rad-hard quad exclusive NOR gate	HCC4077BDG	920105503	ESCC Flight	DIL14 FP	Gold	920105503	2.20
		HCC4077BDT	920105504	ESCC Flight	DIL14 FP	Solder Dip	920105504	2.20
		HCC4077BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4077BK1	0.70
		HCC4077BKG	920105501	ESCC Flight	FLAT14 ESA FP	Gold	920105501	0.70
		HCC4077BKT	920105502	ESCC Flight	FLAT14 ESA FP	Solder Dip	920105502	0.70
HCC4081B	Rad-hard quad 2-input AND gate	HCC4081BDG	920105203	ESCC Flight	DIL14 FP	Gold	920105203	2.20
		HCC4081BDT	920105204	ESCC Flight	DIL14 FP	Solder Dip	920105204	2.20
		HCC4081BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4081BK1	0.70
		HCC4081BKG	920105201	ESCC Flight	FLAT14 ESA FP	Gold	920105201	0.70
		HCC4081BKT	920105202	ESCC Flight	FLAT14 ESA FP	Solder Dip	920105202	0.70
HCC4093B	Rad-hard quad 2-input NAND Schmitt trigger	HCC4093BDG	940900203	ESCC Flight	DIL14 FP	Gold	940900203	2.20
		HCC4093BDT	940900204	ESCC Flight	DIL14 FP	Solder Dip	940900204	2.20
		HCC4093BK1	-	Engineering Model	FLAT14 ESA EM	Gold	HCC4093BK1	0.70
		HCC4093BKG	940900201	ESCC Flight	FLAT14 ESA FP	Gold	940900201	0.70
		HCC4093BKT	940900202	ESCC Flight	FLAT14 ESA FP	Solder Dip	940900202	0.70
HCC4094B	Rad-hard 8-stage shift-and-store bus register	HCC4094BDG	930602608	ESCC Flight	DIL16 FP	Gold	930602608	2.20
		HCC4094BDT	930602609	ESCC Flight	DIL16 FP	Solder Dip	930602609	2.20

Product name	Description	Commercial Product ⁽¹⁾	ESCC specification	Quality level	Package ⁽²⁾	Lead finish	Marking ⁽³⁾	Mass (g)
HCC4094B	Rad-hard 8-stage shift-and-store bus register	HCC4094BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4094BK1	0.70
		HCC4094BKG	930602601	ESCC Flight	FLAT16 ESA FP	Gold	930602601	0.70
		HCC4094BKT	930602602	ESCC Flight	FLAT16 ESA FP	Solder Dip	930602602	0.70
HCC4098B	Rad-hard dual monostable multivibrator	HCC4098BDG	920600308	ESCC Flight	DIL16 FP	Gold	920600308	2.20
		HCC4098BDT	920600309	ESCC Flight	DIL16 FP	Solder Dip	920600309	2.20
		HCC4098BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4098BK1	0.70
		HCC4098BKG	920600301	ESCC Flight	FLAT16 ESA FP	Gold	920600301	0.70
		HCC4098BKT	920600302	ESCC Flight	FLAT16 ESA FP	Solder Dip	920600302	0.70
HCC4512B	Rad-hard 8-channel data selec. with 3-state output	HCC4512BDG	940800608	ESCC Flight	DIL16 FP	Gold	940800608	2.20
		HCC4512BDT	940800609	ESCC Flight	DIL16 FP	Solder Dip	940800609	2.20
		HCC4512BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4512BK1	0.70
		HCC4512BKG	940800601	ESCC Flight	FLAT16 ESA FP	Gold	940800601	0.70
		HCC4512BKT	940800602	ESCC Flight	FLAT16 ESA FP	Solder Dip	940800602	0.70
HCC4514B	Rad-hard 4-bit latch / 4-to-16 line decoder output high	HCC4514BDG	940801203	ESCC Flight	DIL24 large FP	Gold	940801203	5.20
		HCC4514BDT	940801204	ESCC Flight	DIL24 large FP	Solder Dip	940801204	5.20
		HCC4514BK1	-	Engineering Model	FLAT24 EM	Gold	HCC4514BK1	1.70
		HCC4514BKG	940801201	ESCC Flight	FLAT24 FP	Gold	940801201	1.70
		HCC4514BKT	940801202	ESCC Flight	FLAT24 FP	Solder Dip	940801202	1.70
HCC4520B	Rad-hard dual binary up-down counter	HCC4520BDG	920402808	ESCC Flight	DIL16 FP	Gold	920402808	2.20
		HCC4520BDT	920402809	ESCC Flight	DIL16 FP	Solder Dip	920402809	2.20
		HCC4520BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4520BK1	0.70
		HCC4520BKG	920402801	ESCC Flight	FLAT16 ESA FP	Gold	920402801	0.70
		HCC4520BKT	920402802	ESCC Flight	FLAT16 ESA FP	Solder Dip	920402802	0.70
HCC4538B	Rad-hard dual precision monostable multivibrator	HCC4538BDG	920700708	ESCC Flight	DIL16 FP	Gold	920700708	2.20
		HCC4538BDT	920700709	ESCC Flight	DIL16 FP	Solder Dip	920700709	2.20
		HCC4538BK1	-	Engineering Model	FLAT16 ESA EM	Gold	HCC4538BK1	0.70

Product name	Description	Commercial Product ⁽¹⁾	ESCC specification	Quality level	Package ⁽²⁾	Lead finish	Marking ⁽³⁾	Mass (g)
HCC4538B	Rad-hard dual precision monostable multivibrator	HCC4538BKG	920700701	ESCC Flight	FLAT16 ESA FP	Gold	920700701	0.70
		HCC4538BKT	920700702	ESCC Flight	FLAT16 ESA FP	Solder Dip	920700702	0.70
HCC4556B	Rad-hard dual 1-of-4 decoder / demux output low	HCC4556BDG	940802508	ESCC Flight	DIL16 FP	Gold	940802508	2.20
		HCC4556BDT	940802509	ESCC Flight	DIL16 FP	Solder Dip	940802509	2.20
		HCC4556BKG	940802501	ESCC Flight	FLAT16 ESA FP	Gold	940802501	0.70
		HCC4556BKT	940802502	ESCC Flight	FLAT16 ESA FP	Solder Dip	940802502	0.70

1. The complete specification of each type (including information about packages) is available from the ESCC web site: <https://escies.org> using its ESCC part number.
2. The upper metallic lid is not electrically connected to any pins, nor to the IC die inside the package.
3. Specific marking only. Complete marking includes the following: ST logo; ESA logo; Date code (details of the date code are provided in Section 7.1: Date code); ESCC part number (as mentioned in above table); Country of origin (FR = France); Part serial number within the assembly lot.

4 Other information

Date code:

The date code is structured as ESCC flight: yywwz

yy = last two digits of the year, ww = week digits and z = lot index of the week.

Product documentation

Table 5. Documentation provided for ESCC flight

Quality level	Item
ESCC flight	Certificate of Conformance
	0.1 rad/s radiation verification test report

Revision history

Table 6. Document revision history

Date	Version	Changes
24-Mar-2010	1	Initial release.
29-Mar-2010	2	Updated cover page description
10-Aug-2011	3	Added note 1. on page 12, note 1. on page 13, note 1. on page 14, note 1. on page 15, note 1. on page 16, note 1. on page 17 and in the "Pin connections" diagram on the cover page.
26-Apr-2013	4	<p>Small text change to Description.</p> <p>Table 1: Device summary: removed part numbers HCC4016B, HCC4035B, HCC4099B, HCC4502B, and HCC4508B; updated ESCC specification for HCC4098B (9206/003 instead of 9206/002).</p> <p>Added "inches" dimensions to Table 4, Table 5, Table 6, Table 7, Table 8, and Table 9.</p> <p>Updated Table 11: Documentation provided for ESCC flight.</p> <p>Added Section 6: Other information.</p>
01-Apr-2014	5	Table 10: Ordering information: all order codes changed to new ST ordering code scheme, updated footnote 1.
15-Feb-2016	6	<p>Features: updated SEL and SEU immunity; added SET immunity</p> <p>Table 1: Device summary: added "SEE class" and footnote 1</p> <p>Added Section 4: Radiations</p> <p>Section 5: Package information: updated terminology</p> <p>Table 13: Ordering information: removed "ESCC" from column "Radiation level", added footnote 2.</p>
28-Jul-2017	7	Updated Section 4.1: Total ionizing dose (TID)
05-Nov-2020	8	<p>Updated cover page.</p> <p>Removed maximum ratings and package information sections.</p> <p>Updated Order codes and Section 4 Other information.</p>

Contents

1	Input equivalent circuit diagram.....	2
2	Radiations.....	3
2.1	Total ionizing dose.....	3
2.2	Single event effects (SEE).....	4
3	Ordering information	5
4	Other information.....	13
	Revision history	14

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2020 STMicroelectronics – All rights reserved