

BRITISH STANDARDS INSTITUTION
2 PARK STREET, LONDON W1A 2BS

BS CECC 500 12-016

ISSUE 1 NOVEMBER 1982



Page 1 of 14 pages

ELECTRONIC COMPONENT OF ASSESSED QUALITY
IN ACCORDANCE WITH:
CECC 50000, Issue 3

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DETAIL SPECIFICATION FOR:

2N6659
2N6660
2N6661

ORDERING INFORMATION:

See clause 7 of this document

1. MECHANICAL DESCRIPTION



For Detail Dimensions See IEC 191-2 B4C and C4
Marking: See Clause 6 of this document

2.

Semiconductor Material : Silicon
Polarity : N-Channel
Device type : Insulated gate enhancement
Encapsulation : Hermetically sealed metal can
Application : High speed switching/ LF amplification
Power : Case rated

3. LEVELS OF QUALITY ASSESSMENT

E, F and L

4. LIMITING VALUES (Absolute maximum rating system)

These apply over the operating temperature range unless otherwise stated.

CECC 50012 Section 3 Reference		SYMBOL	VALUE		
			MIN.	MAX.	UNIT
4.1	Operating temperature range	T_{case}	-55	150	$^{\circ}C$
4.2	Storage temperature range	T_{stg}	-55	150	$^{\circ}C$
4.3	Drain - source voltage	V_{DSX}	-	35	V
				60	V
				90	V
4.4	Gate - source voltage	V_{GSR}	-30	30	V
4.5	Gate - drain reverse voltage	V_{GDO}	-	35	V
				60	V
				90	V
4.7	Drain current - continuous $T_{amb} = 25^{\circ}C$	I_D	-	1.4	A
				1.1	A
				0.9	A
				3.0	A
	- pulsed $t_p = 300 \mu s$, 1% duty cycle				
4.8	Power dissipation ($T_{case} = 25^{\circ}C$) (derate linearly at the rate of 50 mW/ $^{\circ}C$)	P_{tot}	-	6.25	W

See the relevant Qualified Products List for availability of components made to this specification.

5. CHARACTERISTICS

$T_{\text{case}} = 25^{\circ}\text{C}$ unless otherwise stated.

† indicates verified in inspection testing clause 9.

CECC 50012 Section 3 Reference	PARAMETER AND TEST CONDITIONS	Symbol	Min.	Max.	Units
5.1 [†]	Gate reverse current $V_{\text{GS}} = 15.0 \text{ V}$ $V_{\text{DS}} = 0 \text{ V}$ All types	$I_{\text{GSS}}(1)$	—	100	nA
5.2 [†]	Gate reverse current $V_{\text{GS}} = 15.0 \text{ V}$ $V_{\text{DS}} = 0 \text{ V}$ $T_{\text{amb}} = 125^{\circ}\text{C}$ All types	$I_{\text{GSS}}(2)$	—	500	nA
5.5 [†]	Gate-source threshold voltage $V_{\text{DS}} = 0.8 \text{ V}$ $V_{\text{DS}} = 2.0 \text{ V}$ $I_{\text{D}} = 1.0 \text{ mA}$ All types	$V_{\text{GS}}(\text{TO})$	0.8 —	— 2.0	V V
5.6 [†]	Drain current (pulsed) $V_{\text{GS}} = 10.0 \text{ V}$ $V_{\text{DS}} = 25.0 \text{ V}$ All types	I_{D}	1.5	3.0	A
5.7 [†]	Drain continuous — off current at $V_{\text{GS}} = 0$ $V_{\text{DS}} = 35.0 \text{ V}$ $V_{\text{DS}} = 60.0 \text{ V}$ $V_{\text{DS}} = 90.0 \text{ V}$ $T_{\text{amb}} = 125^{\circ}\text{C}$ 2N6659 2N6660 2N6661 All types	I_{DSX} $I_{\text{DSX}}(2)$	— — — —	10 10 10 500	μA μA μA μA
5.8 [†]	Drain-source on-state voltage $V_{\text{GS}} = 5.0 \text{ V}$ $I_{\text{D}} = 0.3 \text{ A}$ $V_{\text{GS}} = 10.0 \text{ V}$ $I_{\text{D}} = 1.0 \text{ A}$ $V_{\text{GS}} = 5.0 \text{ V}$ $I_{\text{D}} = 0.3 \text{ A}$ $V_{\text{GS}} = 10.0 \text{ V}$ $I_{\text{D}} = 1.0 \text{ A}$ $V_{\text{GS}} = 5.0 \text{ V}$ $I_{\text{D}} = 0.3 \text{ A}$ $V_{\text{GS}} = 10.0 \text{ V}$ $I_{\text{D}} = 1.0 \text{ A}$ 2N6659 2N6659 2N6660 2N6660 2N6661 2N6661	$V_{\text{DS}}(\text{ON})$	— — — — — —	1.5 1.8 1.5 3.0 1.6 4.0	V V V V V V

Note: Pulse tests 80 μs to 300 μs see PW, 1% duty cycle.

5. CHARACTERISTICS

$T_{case} = 25^{\circ}C$ unless otherwise stated.

† indicates verified in inspection testing clause 9.

CECC 50012 Section 3 Reference	PARAMETER AND TEST CONDITIONS	Symbol	Min.	Max.	Units
	Static on-state resistance $V_{GS} = 10\text{ V}$ $I_D = 1.0\text{ A}$ 2N6659 $V_{GS} = 10\text{ V}$ $I_D = 1.0\text{ A}$ 2N6660 $V_{GS} = 10\text{ V}$ $I_D = 1.0\text{ A}$ 2N6661	$R_{DS(ON)}$	—	1.8 3.0 4.0	Ω Ω Ω
	Small-signal on-state resistance $V_{GS} = 10\text{ V}$ $I_D = 1.0\text{ A}$ $f = 1.0\text{ KHz}$ 2N6659 $V_{GS} = 10\text{ V}$ $I_D = 1.0\text{ A}$ $f = 1.0\text{ KHz}$ 2N6660 $V_{GS} = 10\text{ V}$ $I_D = 1.0\text{ A}$ $f = 1.0\text{ KHz}$ 2N6661	$R_{ds(ON)}$	—	1.8 3.0 4.0	Ω Ω Ω
5.9.1†	Input capacitance $V_{GS} = 0\text{ V}$ $V_{DS} = 25.0\text{ V}$ $f = 1.0\text{ Mhz}$	C_{11ss}	—	50	pF
5.9.2†	Output capacitance $V_{GS} = 0\text{ V}$ $V_{DS} = 25.0\text{ V}$ $f = 1.0\text{ Mhz}$ All types	C_{22ss}	—	65	pF
5.9.3†	Reverse transfer capacitance $V_{GS} = 0\text{ V}$ $V_{DS} = 25.0\text{ V}$ $f = 1.0\text{ Mhz}$	C_{12ss}	—	10	pF
5.9(sect 1)	Forward tranconductance $V_{DS} = 25\text{ V}$ $I_D = 0.5\text{ A}$ $f = 1.0\text{ KHz}$	g_{21s}	170	400	mmho
SEE SWITCHING TIME TEST CIRCUIT, APPENDIX I					
5.10†	Turn-ON delay time All types	$t_{d(ON)}$	—	5	ns
5.10†	Rise time All types	t_r	—	5	ns
5.10†	Turn-OFF delay time All types	$t_{d(OFF)}$	—	5	ns
5.10†	Fall time All types	t_f	—	5	ns

6. MARKING

- 1) Each transistor shall bear the following marking:
 - a) The manufacturer's type number (See Table 1).
 - b) The factory identification code.
 - c) The date code.
- 2) Each package containing one or more of these transistors shall bear all the above markings except (b) and in addition
 - d) This detail specification number (See Table 1).
- 3) Interpretation of marking information

XXXXXX

X

Y

Device Type No. _____

Quality Assessment Level _____

Screening Sequence _____

KEY:

Quality Assessment Level
(CECC 50000 ISSUE III APPENDIX IIA)

E
F
L

Screening Sequence
(CECC 50000 ISSUE III APPENDIX VI)

BLANK
A
B
C
D

No Screening
Sequence A
Sequence B
Sequence C
Sequence D

7. ORDERING INFORMATION

The following minimum information is necessary to order a specific device, unless otherwise specified:

- precise type number
- CECC reference of detail specification with issue number and/or date when relevant
- level of quality assessment as defined in Appendix II A of CECC 50000, and, if required, screening sequence as defined in Appendix VI of CECC 50000
- any other particulars.

TABLE 1

ORDER TYPE	SPECIFICATION NUMBER			MARKING
BS 2N6659X – Y to	BS CECC 50012-016	Issue 1	dated November 1982	2N6659X – Y
BS 2N6660X – Y to	BS CECC 50012-016	Issue 1	dated November 1982	2N6660X – Y
BS 2N6661X – Y to	BS CECC 50012-016	Issue 1	dated November 1982	2N6661X – Y

8. RELATED DOCUMENTS

BS 6001	Sampling procedures and tables for inspection by attributes.
BSE 9000	General requirements for electronic components of assessed quality.
BS CECC 50000	Generic specification for discrete semiconductor devices.
CECC 00200	Qualified products list.
IEC 147	Essential ratings and characteristics of semiconductor devices and general principles of measuring methods.
IEC 191-2	Mechanical standardisation of semiconductor devices – Dimensions.
PD 9002	BS 9000 Component selection guide.

9. TEST CONDITIONS AND INSPECTION REQUIREMENTS

These are given in the following tables, where the values and exact test conditions to be used should be specified as required for a given type, and as required by the relevant text in CECC 50000.

GROUP A

Lot by lot

All tests are non-destructive (3.5.6 of CECC 50000)

Clause numbers are made with respect to CECC 50000 unless otherwise stated.

EXAMINATION OR TEST AND REFERENCE	CONDITIONS $T_{\text{case}} = 25^{\circ}\text{C}$ unless otherwise stated	INSPECTION REQUIREMENTS						
		LIMITS			LEVELS			
		Min.	Max.	Unit	E		F + L	
					IL	AQL	IL	AQL
<u>Subgroup A1</u> Visual inspection (4.2.1)	4.2.1				I	0.65%	I	1.5%
<u>Subgroup A2a</u> Non-operatives $I_{\text{GSS}(1)}$ (4.3.4 T.071) $V_{\text{GS}(\text{TO})}$ (4.3.4 T.075)	$V_{\text{GS}} = 15 \text{ V}$ $V_{\text{DS}} = 0 \text{ V}$ $V_{\text{DS}} = 6 \text{ V}$ All types $V_{\text{DS}} = 0.08 \text{ V}$ $I_{\text{D}} = 1 \text{ mA}$ All types	— — 0.08	1.0 6.0 —	μA V V	II	0.15%	II	0.15%
<u>Subgroup A2b</u> Gate reverse current (4.3.4 T.071) $I_{\text{GSS}(1)}$ Gate-source threshold voltage $V_{\text{GS}(\text{TO})}$ (4.3.4 T.075) Drain current (4.3.4 T.072) I_{D} Pulse test Drain-source saturation voltage $V_{\text{DS}(\text{sat})}$ (4.3.4 T.085) Pulse test 								

Note: Pulse tests 80 μ sec PW, 1% duty cycle.