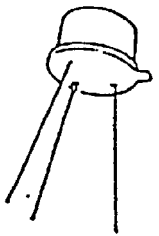


BRITISH STANDARDS INSTITUTION 2 Park Street, London W1A 2BS Electronic Components of Assessed Quality in accordance with CECC 50000, Issue 3.	BSCECC 50012-037 Issue D, April 1989 Page 1 of 21 Pages
Specification available from:- As shown in PD 9002, CECC 00200 and INTERNATIONAL RECTIFIER CO (GB) LTD Hurst Green, Oxted, Surrey RH8 9BB Tel (08833) 3215 Telex 95219	DETAIL SPECIFICATION FOR:- Single Gate Field Effect Transistor, P Channel, enhanced gate. Type Numbers:- <u>Similar to</u> 2N6849 IRFF9130 2N6851 IRFF9230
1: <u>MECHANICAL DESCRIPTION</u> CAUTION: Static Sensitive Devices, see Clause 9.	ORDERING INFORMATION:- See Clause 7 of this document
 OUTLINE: Similar to IEC 191-2 84C/C4. For detail dimensions and terminal connections see outline Page 21 of this document. MARKING: See Clause 6 of this document	2: Semiconductor Material : Silicon Encapsulation : Hermetically Sealed Metal Can Application : a. Low Frequency amplification : b. Switching Power : Case rated : 25 W $T_{case} = 25^{\circ}C$ 3: LEVELS OF QUALITY ASSESSMENT: E, plus additional tests Screening level A, B, C or D

4: LIMITING VALUES (Absolute maximum rating systems)

These apply over the operating temperature range unless otherwise stated.

CECC 50012 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 at $V_{GS} = 0$ $T_J = 25^{\circ}C$ to $150^{\circ}C$	$-V_{DS}$	-	100 200	V V
4.4	Reverse gate-source voltage at $V_{DS} = 0$	V_{GSR}	-	20	V
4.5	Gate-drain voltage with source open circuit	$-V_{GDO}$	-	20	V
4.7	Continuous drain current at $T_{case} = 25^{\circ}C$	$-I_D$	-	6.5 4.0	A A
4.7.1	Pulsed drain current $T_{case} = 25^{\circ}C$	$-I_{DM}$	-	26.0 16.0	A A
4.8	Power dissipation (see derating curve Page 15) $T_{case} = 25^{\circ}C$	P_{Tot}	-	25	W

See the relevant Qualified Products List for the availability of Components
 qualified under this detail specification.

CHARACTERISTICS

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

† Indicates verified in inspection testing Clause 10.

CECC 50012 REFERENCE	PARAMETER AND TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
SECTION 1					
† 5.1	Leakage current with drain short circuit to source at $V_{\text{GSR}} = 20\text{V}$	$-I_{\text{GSS}}(1)$	-	100	nA
† 5.2	Leakage current with drain short circuit to source at $V_{\text{GSR}} = 15\text{V}$; $T_{\text{case}} = 125^{\circ}\text{C}$	$-I_{\text{GSS}}(2)$	-	200	nA
† 5.5	Gate-source threshold voltage at $-V_{\text{DS}} = 20\text{V}$; $-I_{\text{D}} = 250\mu\text{A}$	$-V_{\text{GS}}(\text{T0})(1)$	2.0	4.0	V
† 5.5.1	Gate-source threshold voltage at $T_{\text{case}} = 125^{\circ}\text{C}$; $-V_{\text{DS}} = 20\text{V}$; $-I_{\text{D}} = 250\mu\text{A}$	$-V_{\text{GS}}(\text{T0})(2)$	1.0	-	V
† 5.5.2	Gate-source threshold voltage at $T_{\text{case}} = -55^{\circ}\text{C}$; $-V_{\text{DS}} = 20\text{V}$; $-I_{\text{D}} = 250\mu\text{A}$	$-V_{\text{GS}}(\text{T0})(3)$	-	5.0	V
† 5.6	On-state drain current at $-V_{\text{DS}} = 5\text{V}$; $-V_{\text{GS}} = 7\text{V}$	$-I_{\text{D}}$			
	2N6849		6.25	33.75	A
	2N6851		5.50	29.70	A
† 5.7	Input capacitance, $f = 1\text{ MHz}$; $-V_{\text{DS}} = 25\text{V}$; $-V_{\text{GS}} = 0\text{V}$	C_{iss}			
	2N6849		-	1000	pF
	2N6851		-	900	pF
† 5.9	Short circuit forward transconductance at $-V_{\text{DS}} = 5\text{V}$	g_{21s}			
	$-I_{\text{D}} = 4.1\text{A}$ 2N6849		2.5	7.5	S
	$-I_{\text{D}} = 2.4\text{A}$ 2N6851		2.2	6.6	S
	Pulse conditions $t_{\text{p}} \leq 300\mu\text{s}$, duty cycle $\leq 2\%$				
	See Appendix 11 for test circuit				

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

CECC 50012 REFERENCE	PARAMETER AND TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
SECTION 3					
† 5.7	Drain cut off current at $V_{GS} = 0$ - $V_{DS} = 100V$ 2N6849 - $V_{DS} = 200V$ 2N6851	- $I_{DSX(1)}$	-	250 250	μA μA
† 5.7.1	Drain cut off current at $V_{GS} = 0$; $T_{caso} = 125^{\circ}C$ - $V_{DS} = 80V$ 2N6849 - $V_{DS} = 160V$ 2N6851	- $I_{DSX(2)}$	-	1.0 1.0	mA mA
† 5.8	Drain-source on-state voltage at - $V_{GS} = 10V$ - $I_D = 4.1A$ 2N6849 - $I_D = 2.4A$ 2N6851	- $V_{DS(on)}$	-	1.23 1.92	V V
† 5.9	Small signal common source, capacitance at $f = 1\text{ MHz}$; - $V_{DS} = 25\text{ V}$; - $V_{GS} = 0\text{ V}$				
† 5.9.2	Output capacitance 2N6849 2N6851	C_{22ss}	-	450 300	pF pF
† 5.9.3	Reverse transfer capacitance 2N6849 2N6851	C_{12ss}	-	200 90	pF pF
† 5.10	Switching times at - $V_{GS(on)} = 10\text{ V}$ Turn on delay time - $I_D = 4.1A$; - $V_{DD} = 50V$ 2N6849 - $I_D = 2.4A$; - $V_{DD} = 75V$ 2N6851 Rise time - $I_D = 4.1A$; - $V_{DD} = 50V$ 2N6849 - $I_D = 2.4A$; - $V_{DD} = 75V$ 2N6851	$t_{d(on)}$ t_r	- -	60 50 140 100	ns ns ns ns

5: CHARACTERISTICS

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

[†] Indicates verified in inspection testing Clause 10.

CECC 50012 REFERENCE	PARAMETER AND TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
SECTION 3					
[†] 5.10(cont)	Fall time $-I_D = 4.1\text{A}; -V_{DD} = 48\text{V}$ 2N6849 $-I_D = 2.4\text{A}; -V_{DD} = 75\text{V}$ 2N6851 Turn off delay time $-I_D = 4.1\text{A}; -V_{DD} = 40\text{V}$ 2N6849 $-I_D = 2.4\text{A}; -V_{DD} = 75\text{V}$ 2N6851 See Appendix II for test circuit	t_f $t_{d(\text{off})}$	-	140	ns
			-	100	ns
			-	140	ns
			-	80	ns
SECTION 1 AND 3					
[†] 5.11	Thermal resistance, junction to air Thermal resistance, junction to case	$R_{th(j-a)}$ $R_{th(j-case)}$	-	175	K/W
			-	8.33	K/W
SECTION 4					
[†] 5.6	Drain-source on state resistance at $-V_{GS} = 10\text{V}$ $-I_D = 4.1\text{A}$ 2N6849 $-I_D = 2.4\text{A}$ 2N6851	$r_{DS(on)(1)}$	-	0.3	Ω
			-	0.8	Ω
[†] 5.6.1	Drain-source on state resistance at $T_{\text{case}} = +125^{\circ}\text{C}$ $-I_D = 4.1\text{A}$ 2N6849 $-I_D = 2.4\text{A}$ 2N6851	$r_{DS(on)(2)}$	-	0.54	Ω
			-	1.60	Ω

6: MARKING

The following shall be marked on the device, in the following order of precedence, as space permits. All the information shall appear on the primary pack used as initial protection or wrapping for delivery:-

1. The manufacturer's type number
2. Date Code
3. Factory identification code
4. Level of quality assessment and screening level (if required)

Each package containing one or more of these transistors shall contain all the above markings and in addition -

5. This detail specification number (CECC 50012-037)
6. A 'STATIC SENSITIVE' warning label

7: ORDERING INFORMATION

The following minimum information is necessary to order a specific device.

1. Precise type number
2. This detail specification number, issue number and date
3. Level of quality assessment and screening level (if required)

Example:-

2N6849 to CECC 50012-037 Issue B JUNE 1985 Level E/B.

8: RELATED DOCUMENTS

CECC 50000	Generic Specification for discrete semiconductors
CECC 00007	Basic Specification. Sampling plans and procedures for inspection by attributes
IEC 68-2	Environmental testing of electronic components and electronic equipment.
IEC 191-2	Mechanical standardization of semiconductor devices - dimensions.

9: RECOMMENDED HANDLING PRECAUTIONS : STATIC SENSITIVE DEVICES

To prevent damage by static discharge to these devices during handling, the procedures specified in BS 5783 'Handling procedures for static sensitive devices' should be followed.

10: 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 in line with the indications given in CECC 50000 for the relevant test.

GROUP A Lot by Lot AQL given in § All tests are non-destructive (3.5.6 of CECC 50000) Clause numbers are made with respect to CECC 50000 unless otherwise stated Pulse tests : $t_p \leq 300 \mu s$, duty cycle $\leq 2\%$ where indicated.							
EXAMINATION OR TEST	REF	CONDITIONS at $T_{case} = 25^\circ C$ UNLESS OTHERWISE STATED	INSPECTION REQUIREMENTS				
			LIMITS			LEVEL E	
			MIN	MAX	UNIT	IL	AQL
<u>Subgroup A1</u>						I	0.65
Visual inspection	4.2.1						
<u>Subgroup A2a</u>						II	0.15
Non-operative $-I_{GSS}(1)$	4.3.4 T-071	Short or open circuit $V_{GSR} = 20 V$	-	1.0	μA		
$-V_{GS}(T0)(1)$	4.3.4 T-075	$-V_{DS} = 20 V$	-	12	V		
<u>Subgroup A2b</u>						II	0.4
Leakage current $-I_{GSS}(1)$	4.3.4 T-071	$V_{GSR} = 20 V$ $-V_{DS} = 0 V$	-	100	nA		
Drain cut off current $-I_{DSX}(1)$	4.3.4 T-073	$-V_{GS} = 0 V$ $-V_{DS} = 100V$ 2N6849 $-V_{DS} = 200V$ 2N6851	-	250	μA		
			-	250	μA		
Gate source threshold voltage $-V_{GS}(T0)(1)$	4.3.4 T-075	$-V_{DS} = 20 V$ $-I_D = 250 A$	2.0	4.0	V		
Drain current $-I_D$	4.3.4 T-072	$-V_{DS} = 5 V$ $-V_{GS} = 7 V$					
pulsed		2N6849 2N6851	6.25 5.50	33.75 29.70	A A		

GROUP A
Lot by Lot

AQL given in §

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

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

Pulse tests : $t_p \leq 300 \mu s$, duty cycle $\leq 2\%$ where indicated.

EXAMINATION OR TEST	REF	CONDITIONS	INSPECTION REQUIREMENTS				
		at $T_{case} = 25^{\circ}C$ UNLESS OTHERWISE STATED	LIMITS		UNIT	LEVEL E	
			MIN	MAX		IL	AQL
<u>Subgroup AZb(cont)</u>							
Drain-source on-state resistance $r_{DS(on)}(1)$ pulsed	4.3.4 T-082	$-V_{GS} = 10\text{ V}$ $-I_D = 2.6A$ 2N6849 $-I_D = 1.6A$ 2N6851	-	0.3 0.8			
Drain-Source on-state voltage $-V_{DS(on)}$ pulsed	4.3.4 T-085	$-V_{GS} = 10\text{ V}$ $-I_D = 2.6A$ 2N6849 $-I_D = 1.6A$ 2N6851	-	1.23 1.92	V V		
<u>Subgroup A3</u>							
Short circuit forward transconductance g_{21s} pulsed	4.3.4 T-078	$-V_{DS} = 5\text{ V}$ $-I_D = 4.1A$ 2N6849 $-I_D = 2.4A$ 2N6851	2.5 2.2	7.5 6.6	S S	11	0.65
<u>Subgroup A4</u>							
Switching times	4.3.4 T-081	$-V_{GS} = 10V$ $-I_D = 4.1A$ 2N6849 $-I_D = 2.4A$ 2N6851 $-V_{DD} = 50V$ 2N6849 $-V_{DD} = 75V$ 2N6851				S4	1.0
Turn on delay time $t_{d(on)}$		2N6849 2N6851	- -	60 50	ns ns		
Rise time t_r		2N6849 2N6851	- -	140 100	ns ns		