

BRITISH STANDARDS INSTITUTION
2 Park Street, London W1A 2BS
Electronic Components of Assessed Quality
in accordance with CECC 50000, Issue 3.
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

1: **MECHANICAL DESCRIPTION**
CAUTION: Static Sensitive
Devices, see Clause 9.



OUTLINE: Similar to IEC 191-2 B4C/C4.
For detail dimensions and terminal
connections see outline Page 21 of this
document.

MARKING: See Clause 6 of this document

BSCECC 50012-036
Issue 1, Feb, 1990
Page 1 of 21 Pages



DETAIL SPECIFICATION FOR:-
Single Gate Field Effect Transistor,
P Channel, enhanced gate.
Type Numbers:- Similar to

2N6845 IRFF9120
2N6847 IRFF9220

ORDERING INFORMATION:-
See Clause 7 of this document

2: Semiconductor
Material : Silicon
Encapsulation : Hermetically
Sealed Metal Can
Application : a. Low Frequency
amplification
: b. Switching
Power : Case rated : 20 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 $150^{\circ}C$	$-V_{DSS}$	-	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 $T_{case} = 25^{\circ}C$	$-I_D$	-	4.0 2.5	A A
4.7.1	Pulsed drain current $T_{case} = 25^{\circ}C$	$-I_{DM}$	-	16.0 10.0	A A
4.8	Power dissipation (see derating curve Page 15) $T_{case} = 25^{\circ}C$	P_{tot}	-	20	W

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

5: CHARACTERISTICS

 $T_{case} = 25^{\circ}C$ 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 $V_{GSR} = 20V$	$-I_{GSS(1)}$	-	100	nA
† 5.2	Leakage current with drain short circuit to source at $V_{GSR} = 15V$; $T_{case} = 125^{\circ}C$	$-I_{GSS(2)}$	-	200	nA
† 5.5	Gate-source threshold voltage at $-V_{DS} = 20V$; $-I_D = 250\mu A$	$-V_{GS(T0)(1)}$	2.0	4.0	V
† 5.5.1	Gate-source threshold voltage at $T_{case} = 125^{\circ}C$; $-V_{DS} = 20V$; $-I_D = 250\mu A$	$-V_{GS(T0)(2)}$	1.0	-	V
† 5.5.2	Gate-source threshold voltage at $T_{case} = -55^{\circ}C$; $-V_{DS} = 20V$; $-I_D = 250\mu A$	$-V_{GS(T0)(3)}$	-	5.0	V
† 5.6	On-state drain current at $-V_{DS} = 5V$; $-V_{GS} = 7V$	$-I_D$			
	2N6845		2.5	15	A
	2N6847		2.0	12	A
† 5.7	Input capacitance, $f = 1\text{ MHz}$; $-V_{DS} = 25V$; $-V_{GS} = 0V$	C_{iss}			
	2N6845		-	650	pF
	2N6847		-	550	pF
5.9	Short circuit forward transconductance at $-V_{DS} = 5V$	g_{21s}			
	$-I_D = 2.6A$ 2N6845		1.25	3.75	S
	$-I_D = 1.6A$ 2N6847		1.0	3.0	S
	Pulse conditions $t_p \leq 300\mu s$, duty cycle $\leq 2\%$				
	See Appendix II for test circuit				

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

CECC 50012 REFERENCE	PARAMETER AND TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
SECTION 3					
† 5.7	Drain cut off current at $V_{GS} = 0$ - $V_{DS} = 100V$ 2N6845 - $V_{DS} = 200V$ 2N6847	- $I_{DSX(1)}$	-	250 250	μA μA
† 5.7.1	Drain cut off current at $V_{GS} = 0$; $T_{case} = 125^{\circ}C$ - $V_{DS} = 80V$ 2N6845 - $V_{DS} = 160V$ 2N6847	- $I_{DSX(2)}$	-	1.0 1.0	mA mA
† 5.8	Drain-source on-state voltage at - $V_{GS} = 10V$ - $I_D = 2.6A$ 2N6845 - $I_D = 1.6A$ 2N6847	- $V_{DS(on)}$	-	1.55 2.40	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 2N6845 2N6847	C_{22ss}	-	350 125	pF pF
† 5.9.3	Reverse transfer capacitance 2N6845 2N6847	C_{12ss}	-	100 45	pF pF
† 5.10	Switching times at - $V_{GS(on)} = 10\text{ V}$ Turn on delay time - $I_D = 2.6A$; - $V_{DD} = 40V$ 2N6845 - $I_D = 1.6A$; - $V_{DD} = 75V$ 2N6847 Rise time - $I_D = 2.6A$; - $V_{DD} = 40V$ 2N6845 - $I_D = 1.6A$; - $V_{DD} = 75V$ 2N6847	$t_{d(on)}$ t_r	- -	50 60 100 70	ns ns ns ns

5: CHARACTERISTICS

$T_{case} = 25^{\circ}C$ 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	t_f	-	100	ns
	$-I_D = 2.6A; -V_{DD} = 48V$ 2N6845		-	70	ns
	$-I_D = 1.6A; -V_{DD} = 75V$ 2N6847				
	Turn off delay time	$t_{d(off)}$	-	100	ns
	$-I_D = 2.6A; -V_{DD} = 40V$ 2N6845		-	60	ns
	$-I_D = 1.6A; -V_{DD} = 75V$ 2N6847				
	See Appendix II for test circuit				
SECTION 1 AND 3					
† 5.11	Thermal resistance, junction to air	$R_{th(j-a)}$	-	175	K/W
	Thermal resistance, junction to case	$R_{th(j-case)}$	-	6.25	K/W
SECTION 4					
† 5.6	Drain-source on state resistance at	$r_{DS(on)(1)}$			
	$-V_{GS} = 10V$		-	0.6	Ω
	$-I_D = 2.6A$ 2N6845		-	1.5	Ω
	$-I_D = 1.6A$ 2N6847				
† 5.6.1	Drain-source on state resistance at	$r_{DS(on)(2)}$			
	$T_{case} = +125^{\circ}C$		-	1.00	Ω
	$-I_D = 2.6A$ 2N6845		-	12.94	Ω
	$-I_D = 1.6A$ 2N6847				

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 50012-036)
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:-

2N6845 to CECC 50012-036 Issue 8 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 T075	$-V_{DS} = 20 V$	-	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	$-V_{GS} = 0 V$ $-V_{DS} = 100V$ 2N6845 $-V_{DS} = 200V$ 2N6847	-	250	μA		
			-	250	μA		
Gate source threshold voltage $-V_{GS}(T0)(1)$	4.3.4 T-075	$-V_{DS} = 20 V$ $-I_D = 250 \mu A$	2.0	4.0	V		
Drain current $-I_D$	4.3.4 T-072	$-V_{DS} = 5 V$ $-V_{GS} = 7 V$					
pulsed		2N6845 2N6847	2.5 2.0	15 12	A		

GROUP A					AQL given in %		
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							
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 A2b(cont)</u>							
Drain-source on-state resistance $r_{DS(on)}(1)$ pulsed	4.3.4 T-082	$-V_{GS} = 10 V$ $-I_D = 2.6A$ 2N6845 $-I_D = 1.6A$ 2N6847	-	0.6 1.5			
Drain-Source on-state voltage $-V_{DS(on)}$ pulsed	4.3.4 T-085	$-V_{GS} = 10 V$ $-I_D = 2.6A$ 2N6845 $-I_D = 1.6A$ 2N6847	-	1.55 2.40	V V		
<u>Subgroup A3</u>							
Short circuit forward transconductance g_{21s} pulsed	4.3.4 T-078	$-V_{DS} = 5 V$ $-I_D = 2.6A$ 2N6845 $-I_D = 1.6A$ 2N6847	1.25 1.0	3.75 3.0	S S	II	0.65
<u>Subgroup A4</u>							
Switching times	4.3.4 T-081	$-V_{GS} = 10V$ $-I_D = 2.6A$ 2N6845 $-I_D = 1.6A$ 2N6847 $-V_{DD} = 40V$ 2N6845 $-V_{DD} = 75V$ 2N6847				S4	1.0
Turn on delay time $t_{d(on)}$		2N6845 2N6847	- -	50 60	ns ns		
Rise time t_r		2N6845 2N6847	- -	100 70	ns ns		