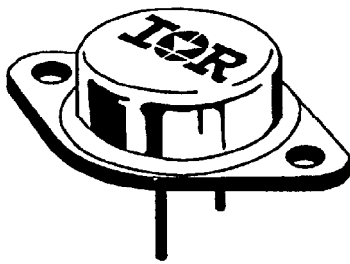


BRITISH STANDARDS INSTITUTION 2 Park Street, London W1A 2BS		BS CECC 50012-056 Issue 1 February 1991 Page 1 of 19			
Electronic Components as Assessed Quality in accordance with CECC 50000, Issue 3.					
Specification available from:- As shown in PD 9002, CECC 00200 and INTERNATIONAL RECTIFIER CO (GB) LTD Hurst Green, Oxted, Surrey RH8 9BB.		DETAIL SPECIFICATION FOR:- Single Gate Field Effect Transistor, N Channel, enhanced gate.			
Tel: (0883) 713215. Tlx:95219. Fax: (0883) 714234.		Type Numbers IRF044 IRF140 IRF240 IRF340 IRF440			
1: MECHANICAL DESCRIPTION CAUTION: Static Sensitive. Devices, see Clause 9.		ORDERING INFORMATION:- See Clause 7 of this document			
OUTLINE: 		2: Semiconductor Material : Silicon. Encapsulation : Hermetically Sealed Metal Can. Application : a. Low frequency amplification. : b. Switching. Power : Case rated : 125/150W @ T _{case} = 25°C			
For detail dimensions and terminal identification see Appendix III.		3: LEVELS OF QUALITY ASSESSMENT: E, plus additional tests. Screening level A, B, C or D.			
MARKING: See Clause 6 of this document.					
4: LIMITING VALUES (Absolute maximum rating system). 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	°C
4.2	Storage temperature range	T _{stg}	-55	+150	°C
4.3	Drain-source voltage at V _{GS} = 0 T _J = 25°C to 150°C	IRF044 IRF140 IRF240 IRF340 IRF440 V _{DSS}	- - - - -	60 100 200 400 500	V V V 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 @ T _{case} = 25°C	IRF044 IRF140 IRF240 IRF340 IRF440 I _D	- - - - -	30.0 28.0 18.0 10.0 8.0	A A A A A
4.71	Pulsed drain current @ T _{case} = 25°C	IRF044 IRF140 IRF240 IRF340 IRF440 I _{DM}	- - - - -	210.0 110.0 72.0 40.0 32.0	A A A A A
4.8	Power dissipation (see derating curve page 15) T _{case} = 25°C	IRF044,IRF140 IRF240,IRF340,IRF440 P _{tot}	- -	150 125	W W
See the relevant Qualified Products List for the availability of Components qualified under this detail specification					

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5: CHARACTERISTICS

$T_{case} = 25^{\circ}\text{C}$ 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 @ $V_{GSR} = 20\text{V}$	$I_{GSS(1)}$	-	100	nA
+ 5.2	Leakage current with drain short circuit to source @ $V_{GSR} = 15\text{V}$, $T_{case} = 125^{\circ}\text{C}$	$I_{GSS(2)}$	-	200	nA
+ 5.5	Gate-source threshold voltage @ $V_{DS} = 20\text{V}$, $I_D = 250\mu\text{A}$	$V_{GS(TO)(1)}$	2.0	4.0	V
+ 5.5.1	Gate-source threshold voltage @ $T_{case} = 125^{\circ}\text{C}$, $V_{DS} = 20\text{V}$, $I_D = 250\mu\text{A}$	$V_{GS(TO)(2)}$	1.0	-	V
+ 5.5.2	Gate-source threshold voltage @ $T_{case} = -55^{\circ}\text{C}$, $V_{DS} = 20\text{V}$, $I_D = 250\mu\text{A}$	$V_{GS(TO)(3)}$	-	5.0	V
+ 5.6	On-state drain current @ $V_{GS} = 7\text{V}$, $V_{DS} = 10\text{V}$ IRF044 IRF140 IRF240 IRF340 IRF440	I_D	31.0 25.0 15.0 9.0 7.0	110.0 75.0 45.0 30.0 25.0	A A A A A
+ 5.7	Input capacitance, $f = 1\text{ MHz}$, $V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$ IRF044 IRF140 IRF240 IRF340 IRF440	C_{iss}	- - - - -	3750 2250 1950 1500 1500	pF pF pF pF pF
+ 5.9	Short circuit forward transconductance $I_D = 33.0\text{A}$ $V_{DS} = 10\text{V}$ IRF044 $I_D = 17.0\text{A}$ $V_{DS} = 10\text{V}$ IRF140 $I_D = 10.0\text{A}$ $V_{DS} = 10\text{V}$ IRF240 $I_D = 5.2\text{A}$ $V_{DS} = 10\text{V}$ IRF340 $I_D = 4.4\text{A}$ $V_{DS} = 10\text{V}$ IRF440 Pulse conditions $t_p < 300\mu\text{s}$, duty cycle $< 2\%$. See Appendix II for test circuit.	g_{21s}	15.0 8.7 6.7 5.8 4.9	40.0 25.0 20.0 15.0 12.0	S S S S S

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5: CHARACTERISTICS
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CECC 50012 REFERENCE	PARAMETER AND TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
SECTION 3					
+ 5.7	Drain cut-off current @ $V_{GS} = 0V$ $V_{DS} = 60V$ IRF044 $V_{DS} = 100V$ IRF140 $V_{DS} = 200V$ IRF240 $V_{DS} = 400V$ IRF340 $V_{DS} = 500V$ IRF440	$I_{DSX(1)}$	-	250	μA
+ 5.7.1	Drain cut-off current @ $V_{GS} = 0V$, $T_C = 125^{\circ}C$ $V_{DS} = 60V$ IRF044 $V_{DS} = 100V$ IRF140 $V_{DS} = 200V$ IRF240 $V_{DS} = 400V$ IRF340 $V_{DS} = 500V$ IRF440	$I_{DSX(2)}$	-	1.0	mA
+ 5.8	Drain-source on-state voltage @ $V_{GS} = 10V$ $I_D = 15.0A$ IRF044 $I_D = 10.0A$ IRF140 $I_D = 5.0A$ IRF240 $I_D = 3.0A$ IRF340 $I_D = 2.5A$ IRF440	$V_{DS(on)}$	-	0.42	V
+ 5.9	Small signal common source, capacitance @ $f = 1MHz$, $V_{DS} = 25V$, $V_{GS} = 0V$	C_{22ss}	-	1700	pF
+ 5.9.2	Output capacitance IRF044 IRF140 IRF240 IRF340 IRF440				
+ 5.9.3	Reverse transfer capacitance IRF044 IRF140 IRF240 IRF340 IRF440	C_{12ss}	-	440	pF
			-	200	pF
			-	180	pF
			-	180	pF
			-	180	pF
+ 5.10	Switching times @ $V_{GS(on)} = 10V$ Turn-on delay time $I_D = 33.0A$, $V_{DD} = 30V$ IRF044 $I_D = 17.0A$, $V_{DD} = 55V$ IRF140 $I_D = 10.0A$, $V_{DD} = 100V$ IRF240 $I_D = 5.2A$, $V_{DD} = 200V$ IRF340 $I_D = 4.4A$, $V_{DD} = 250V$ IRF440	$t_{d(on)}$	-	32	ns
			-	23	ns
			-	21	ns
			-	25	ns
			-	32	ns
	Rise time $I_D = 33.0A$, $V_{DD} = 30V$ IRF044 $I_D = 17.0A$, $V_{DD} = 55V$ IRF140 $I_D = 10.0A$, $V_{DD} = 100V$ IRF240 $I_D = 5.2A$, $V_{DD} = 200V$ IRF340 $I_D = 4.4A$, $V_{DD} = 250V$ IRF440	t_r	-	210	ns
			-	110	ns
			-	77	ns
			-	41	ns
			-	35	ns

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5: CHARACTERISTICS

$T_{case} = 25^{\circ}\text{C}$ 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 $I_D = 33.0\text{A}, V_{DD} = 30\text{V}$ IRF044 $I_D = 17.0\text{A}, V_{DD} = 50\text{V}$ IRF140 $I_D = 10.0\text{A}, V_{DD} = 100\text{V}$ IRF240 $I_D = 5.2\text{A}, V_{DD} = 200\text{V}$ IRF340 $I_D = 4.4\text{A}, V_{DD} = 250\text{V}$ IRF440	t_f	-	130 75 54 36 30	ns ns ns ns ns
	Turn-off delay time $I_D = 33.0\text{A}, V_{DD} = 30\text{V}$ IRF044 $I_D = 17.0\text{A}, V_{DD} = 50\text{V}$ IRF140 $I_D = 10.0\text{A}, V_{DD} = 100\text{V}$ IRF240 $I_D = 5.2\text{A}, V_{DD} = 200\text{V}$ IRF340 $I_D = 4.4\text{A}, V_{DD} = 250\text{V}$ IRF440 See Appendix II for test circuit	$t_{d(off)}$	-	75 60 68 75 74	ns ns ns ns ns
SECTION 1 AND 3 + 5.11	Thermal resistance, junction to ambient Thermal resistance, junction to case	$R_{th(j-amb)}$ $R_{th(j-case)}$	- -	30 1.0	K/W K/W
+ 5.6	Drain-source on-state resistance @ $V_{GS} = 10\text{V}$ $I_D = 33.0\text{A}$ IRF044 $I_D = 17.0\text{A}$ IRF140 $I_D = 10.0\text{A}$ IRF240 $I_D = 5.2\text{A}$ IRF340 $I_D = 4.4\text{A}$ IRF440	$r_{DS(on)(1)}$	- - - - -	0.028 0.077 0.180 0.550 0.850	Ω Ω Ω Ω Ω
+ 5.6.1	Drain-source on-state resistance @ $T_C = 125^{\circ}\text{C}$ $I_D = 33.0\text{A}$ IRF044 $I_D = 17.0\text{A}$ IRF140 $I_D = 10.0\text{A}$ IRF240 $I_D = 5.2\text{A}$ IRF340 $I_D = 4.4\text{A}$ IRF440	$r_{DS(on)(2)}$	- - - - -	0.045 0.137 0.345 1.155 1.700	Ω Ω Ω Ω Ω

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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).
Mark of conformity unless a certificate of conformity is used.

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

5. This detail specification number (CECC 50012-056) followed by the letter defining the level of assessment and, if applicable the letter identifying the screening sequence.
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:-

to CECC 50012-056 Issue 1 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.

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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: $t_p < 300\mu s$, duty cycle $< 2\%$ where indicated.							
EXAMINATION OR TEST	REF	CONDITIONS @T_{case} = 25°C UNLESS OTHERWISE STATED	INSPECTION REQUIREMENTS				
			LIMITS			LEVEL E	
			MIN	MAX	UNIT	IL	AQL
SUBGROUP A1						I	0.65
Visual inspection	4.2.1						
SUBGROUP A2a						II	0.15
Non-operative $I_{GSS(1)}$	4.3.4 T-071	Short or open circuit $V_{GSR} = 20V$	-	100	nA		
$V_{GS(TO)(1)}$	4.3.4 T-075	$V_{DS} = 20V$ $I_D = 250\mu A$	2.0	4.0	V		
SUBGROUP A2b						II	0.4
Leakage current $I_{GSS(1)}$	4.3.4 T-071	$V_{GSR} = 20V$ $V_{DS} = 0V$	-	100	nA		
Drain cut off current $I_{DSX(1)}$	4.3.4 T-073	$V_{GS} = 0V$					
		$V_{DS} = 60V$ IRF044	-	250	μA		
		$V_{DS} = 100V$ IRF140	-	250	μA		
		$V_{DS} = 200V$ IRF240	-	250	μA		
		$V_{DS} = 400V$ IRF340	-	250	μA		
		$V_{DS} = 500V$ IRF440	-	250	μA		
Gate source threshold voltage $V_{GS(TO)(1)}$	4.3.4 T-075	$V_{DS} = 20V$ $I_D = 250\mu A$	2.0	4.0	V		
Drain current I_D	4.3.4 T-072	$V_{GS} = 7V$ $V_{DS} = 10V$					
		IRF044	31.0	110.0	A		
		IRF140	25.0	75.0	A		
		IRF240	15.0	45.0	A		
		IRF340	9.0	30.0	A		
		IRF440	7.0	25.0	A		