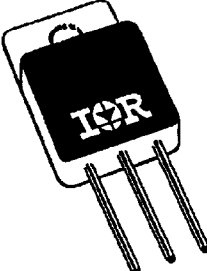


BRITISH STANDARDS INSTITUTION 2 Park Street, London W1A 2BS	BS CECC 50012-062 Issue 1A October 1990 Page 1 of 19 Reprinted July, 1991				
Electronic Components as Assessed Quality in accordance with CECC 50000, Issue 3.					
Specification available from:- As shown in PD 9002, CECC 00200 and INTERNATIONAL RECTIFIER CO (GB) LTD Hurst Green, Oxted, Surrey RH8 9BB.	DETAIL SPECIFICATION FOR:- Single Gate Field Effect Transistor, N Channel, enhanced gate. Type Numbers IRFY044(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY440(M) ORDERING INFORMATION:- See Clause 7 of this document				
Tel: (0883) 713215. Tlx:95219. Fax: (0883) 714234.					
1: MECHANICAL DESCRIPTION CAUTION: Static Sensitive. Devices, see Clause 9. OUTLINE:  For detail dimensions and terminal identification see Appendix III. MARKING: See Clause 6 of this document.	2: Semiconductor Material : Silicon. Encapsulation : Isolated Hermetically Sealed Metal Can. Application : a. Low frequency amplification. : b. Switching. Power : Case rated : 60W @ $T_{case} = 25^{\circ}C$				
	3: LEVELS OF QUALITY ASSESSMENT: E, plus additional tests. Screening level A, B, C or D.				
4: LIMITING VALUES (Absolute maximum rating 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	$^{\circ}C$
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 $150^{\circ}C$	IRFY044(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY440(M)	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 @ $T_{case} = 25^{\circ}C$	IRFY044(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY440(M)	I_D	- - - - -	20.0 18.4 12.4 6.9 5.5	A A A A A
4.71 Pulsed drain current @ $T_{case} = 25^{\circ}C$	IRFY044(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY440(M)	I_{DM}	- - - - -	80.0 73.6 49.6 27.6 22.0	A A A A A
4.8 Power dissipation (see derating curve page 15) $T_{case} = 25^{\circ}C$	All types	P_{tot}	-	60	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 @ $V_{GSR} = 15\text{V}$, $T_{case} = 125^{\circ}\text{C}$	$I_{GSS(2)}$	-	1.0	μA
+ 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 @ $V_{GS} = 10\text{V}$, $V_{DS} = 10\text{V}$ IRFY044(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY440(M)	I_D	20.0 18.4 12.4 6.9 5.5	- - - - -	A A A A A
+ 5.7	Input capacitance, $f = 1\text{ MHz}$, $V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$ IRFY044(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY440(M)	C_{11ss}	- - - - -	3000 1800 1700 1600 1600	pF pF pF pF pF
+ 5.9	Short circuit forward transconductance $I_D = 29.0\text{A}$ $V_{DS} = 5\text{V}$ IRFY044(M) $I_D = 15.0\text{A}$ $V_{DS} = 5\text{V}$ IRFY140(M) $I_D = 10.0\text{A}$ $V_{DS} = 5\text{V}$ IRFY240(M) $I_D = 5.0\text{A}$ $V_{DS} = 5\text{V}$ IRFY340(M) $I_D = 4.0\text{A}$ $V_{DS} = 5\text{V}$ IRFY440(M) Pulse conditions $t_p < 300\mu\text{s}$, duty cycle $< 2\%$. See Appendix II for test circuit.	g_{21s}	15.0 6.0 6.0 4.0 4.0	- - - - -	S S S S S

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

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CECC 50012 REFERENCE	PARAMETER AND TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
SECTION 3					
+ 5.7	Drain cut-off current @ $V_{GS} = 0V$ $V_{DS} = 60V$ IRFY044(M) $V_{DS} = 100V$ IRFY140(M) $V_{DS} = 200V$ IRFY240(M) $V_{DS} = 400V$ IRFY340(M) $V_{DS} = 500V$ IRFY440(M)	$I_{DSX(1)}$	- - - - -	250 250 250 250 250	μA μA μA μA μA
+ 5.7.1	Drain cut-off current @ $V_{GS} = 0V, T_C = 125^{\circ}C$ $V_{DS} = 60V$ IRFY044(M) $V_{DS} = 100V$ IRFY140(M) $V_{DS} = 200V$ IRFY240(M) $V_{DS} = 400V$ IRFY340(M) $V_{DS} = 500V$ IRFY440(M)	$I_{DSX(2)}$	- - - - -	1.0 1.0 1.0 1.0 1.0	mA mA mA mA mA
+ 5.8	Drain-source on-state voltage @ $V_{GS} = 10V$ $I_D = 29.0A$ IRFY044(M) $I_D = 15.0A$ IRFY140(M) $I_D = 10.0A$ IRFY240(M) $I_D = 5.0A$ IRFY340(M) $I_D = 4.0A$ IRFY440(M)	$V_{DS(on)}$	- - - - -	1.02 1.38 1.90 2.75 3.40	V V V V V
+ 5.9	Small signal common source, capacitance @ $f = 1MHz, V_{DS} = 25V, V_{GS} = 0V$	C_{22ss}	-	1200 800 750 450 400	pF pF pF pF pF
+ 5.9.2	Output capacitance IRFY044(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY440(M)				
+ 5.9.3	Reverse transfer capacitance IRFY044(M) IRFY140(M) IRFY240(M) IRFY340(M) IRFY440(M)	C_{12ss}	-	400 300 300 250 200	pF pF pF pF pF
+ 5.10	Switching times @ $V_{GS(on)} = 10V$ Turn-on delay time $I_D = 29.0A, V_{DD} = 25V$ IRFY044(M) $I_D = 15.0A, V_{DD} = 36V$ IRFY140(M) $I_D = 10.0A, V_{DD} = 90V$ IRFY240(M) $I_D = 5.0A, V_{DD} = 175V$ IRFY340(M) $I_D = 4.0A, V_{DD} = 225V$ IRFY440(M)	$t_{d(on)}$	- - - - -	25 30 30 35 35	ns ns ns ns ns
	Rise time $I_D = 29.0A, V_{DD} = 25V$ IRFY044(M) $I_D = 15.0A, V_{DD} = 36V$ IRFY140(M) $I_D = 10.0A, V_{DD} = 90V$ IRFY240(M) $I_D = 5.0A, V_{DD} = 175V$ IRFY340(M) $I_D = 4.0A, V_{DD} = 225V$ IRFY440(M)	t_r	- - - - -	60 60 60 45 30	ns ns ns ns ns

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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 $I_D = 29.0\text{A}, V_{DD} = 25\text{V}$ IRFY044(M) $I_D = 15.0\text{A}, V_{DD} = 36\text{V}$ IRFY140(M) $I_D = 10.0\text{A}, V_{DD} = 90\text{V}$ IRFY240(M) $I_D = 5.0\text{A}, V_{DD} = 175\text{V}$ IRFY340(M) $I_D = 4.0\text{A}, V_{DD} = 225\text{V}$ IRFY440(M)	t_f	-	25 60 60 45 30	ns ns ns ns ns
	Turn-off delay time $I_D = 29.0\text{A}, V_{DD} = 25\text{V}$ IRFY044(M) $I_D = 15.0\text{A}, V_{DD} = 36\text{V}$ IRFY140(M) $I_D = 10.0\text{A}, V_{DD} = 90\text{V}$ IRFY240(M) $I_D = 5.0\text{A}, V_{DD} = 175\text{V}$ IRFY340(M) $I_D = 4.0\text{A}, V_{DD} = 225\text{V}$ IRFY440(M)	$t_{d(\text{off})}$	-	70 80 80 90 60	ns ns ns ns ns
	See Appendix II for test circuit				
	SECTION 1 AND 3				
	+ 5.11 Thermal resistance, junction to ambient Thermal resistance, junction to case	$R_{th(j-\text{amb})}$ $R_{th(j-\text{case})}$	- -	80 2.1	K/W K/W
	D.C. Isolation voltage, terminals to case (All terminals shorted) V_{INS}	1000	-	V	
	Single Pulse Avalanche Energy $V_{DD} = 25\text{V}, I_L = 30.0\text{A}, L = 50\mu\text{H}$ IRFY044(M) $V_{DD} = 50\text{V}, I_L = 18.4\text{A}, L = 0.44\text{mH}$ IRFY140(M) $V_{DD} = 50\text{V}, I_L = 12.4\text{A}, L = 3.50\text{mH}$ IRFY240(M) $V_{DD} = 50\text{V}, I_L = 6.9\text{A}, L = 12.0\text{mH}$ IRFY340(M) $V_{DD} = 50\text{V}, I_L = 5.5\text{A}, L = 20.0\text{mH}$ IRFY440(M)	E_{AS}	- - - - -	53.0 99.3 358.8 326.1 336.1	mJ mJ mJ mJ mJ

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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 50012-062) 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 50012-062 Issue 1A 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 Visual inspection	4.2.1					I	0.65
SUBGROUP A2a Non-operative $I_{GSS(1)}$ $V_{GS(TO)(1)}$	4.3.4 T-071 4.3.4 T-075	Short or open circuit $V_{GSR} = 20V$ $V_{DS} = 20V$ $I_D = 250\mu A$	- 2.0	100 4.0	nA V	II	0.15
SUBGROUP A2b Leakage current $I_{GSS(1)}$ Drain cut off current $I_{DSX(1)}$ Gate source threshold voltage $V_{GS(TO)(1)}$ Drain current I_D pulsed	4.3.4 T-071 4.3.4 T-073 4.3.4 T-075 4.3.4 T-072	$V_{GSR} = 20V$ $V_{DS} = 0V$ $V_{GS} = 0V$ $V_{DS} = 60V$ IRFY044(M) $V_{DS} = 100V$ IRFY140(M) $V_{DS} = 200V$ IRFY240(M) $V_{DS} = 400V$ IRFY340(M) $V_{DS} = 500V$ IRFY440(M) $V_{DS} = 20V$ $I_D = 250\mu A$ $V_{GS} = 7V$ $V_{DS} = 20V$	- 2.0 10.0 7.5 5.5 4.0 5.5	100 4.0 250 250 250 250 250 4.0 80.0 73.6 49.6 27.6 22.0	nA V μA μA μA μA μA V A A A A A	II	0.4