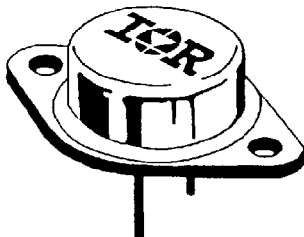


BRITISH STANDARDS INSTITUTION 2 Park Street, London W1A 2BS		BS CECC 50012-070 Issue 1 August 1993 Page 1 of 19			
Electronic Components of Assessed Quality in accordance with CECC 50000, Issue 4.					
Specification available from:- As shown in PD 9002, CECC 00200 and INTERNATIONAL RECTIFIER CO (GB) 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		Similar to	
		IRF150		2N6764	
		IRF250		2N6766	
		IRF350		2N6768	
		IRF450		2N6770	
1: MECHANICAL DESCRIPTION CAUTION: Static Sensitive Devices, see Clause 9.		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 : 150W @ T _{case} = 25°C			
Outline: Similar to IEC 191-2-C14B with B18 Base For detail dimensions and terminal identification see Appendix III. MARKING: See Clause 6 of this document.		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	°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	V _{DSS}	-	100 200 400 500	V V V V
		IRF150 IRF250 IRF350 IRF450	- - - -		
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	I _D	-	30.0 30.0 15.0 13.0	A A A A
		IRF150 IRF250 IRF350 IRF450	- - - -		
4.7.1	Pulsed drain current @ T _{case} = 25°C	I _{DM}	-	160.0 120.0 60.0 52.0	A A A A
		IRF150 IRF250 IRF350 IRF450	- - - -		
4.8	Power dissipation (see derating curve page 15) T _{case} = 25°C	P _{tot}	-	150	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 @ $V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	$V_{GS(TO)(1)}$	2.0	4.0	V
+ 5.5.1	Gate-source threshold voltage @ $T_{case} = 125^{\circ}\text{C}$, $V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	$V_{GS(TO)(2)}$	1.0	-	V
+ 5.5.2	Gate-source threshold voltage @ $T_{case} = -55^{\circ}\text{C}$, $V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	$V_{GS(TO)(3)}$	-	5.0	V
+ 5.6	On-state drain current @ $V_{GS} = 7\text{V}$, $V_{DS} = 10\text{V}$ IRF150 IRF250 IRF350 IRF450	I_D	12.0 16.0 10.0 12.0	100.0 116.0 97.0 100.0	A A A A
+ 5.7	Input capacitance, $f = 1\text{ MHz}$, $V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$ IRF150 IRF250 IRF350 IRF450	C_{11ss}	- - - -	4000 4000 4000 4000	pF pF pF pF
+ 5.9	Short circuit forward transconductance $I_D = 14.0\text{A}$ $V_{DS} = 10\text{V}$ IRF150 $I_D = 10.0\text{A}$ $V_{DS} = 10\text{V}$ IRF250 $I_D = 5.5\text{A}$ $V_{DS} = 10\text{V}$ IRF350 $I_D = 5.0\text{A}$ $V_{DS} = 10\text{V}$ IRF450 Pulse conditions $t_p < 300\mu\text{s}$, duty cycle $< 2\%$. See Appendix II for test circuit.	g_{21s}	6.0 8.0 5.0 6.0	25.0 29.0 24.3 25.0	S S S S

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CECC 50012 REFERENCE	PARAMETER AND TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
SECTION 3					
+ 5.7	Drain cut-off current @ $V_{GS} = 0\text{V}$ $V_{DS} = 100\text{V}$ IRF150 $V_{DS} = 200\text{V}$ IRF250 $V_{DS} = 400\text{V}$ IRF350 $V_{DS} = 500\text{V}$ IRF450	$I_{DSX(1)}$	- - - -	250 250 250 250	μA μA μA μA
+ 5.7.1	Drain cut-off current @ $V_{GS} = 0\text{V}$, $T_C = 125^{\circ}\text{C}$ $V_{DS} = 80\text{V}$ IRF150 $V_{DS} = 160\text{V}$ IRF250 $V_{DS} = 320\text{V}$ IRF350 $V_{DS} = 400\text{V}$ IRF450	$I_{DSX(2)}$	- - - -	1.0 1.0 1.0 1.0	mA mA mA mA
+ 5.8	Drain-source on-state voltage @ $V_{GS} = 10\text{V}$ $I_D = 14.0\text{A}$ IRF150 $I_D = 10.0\text{A}$ IRF250 $I_D = 5.5\text{A}$ IRF350 $I_D = 5.0\text{A}$ IRF450	$V_{DS(on)}$	- - - -	0.77 0.85 1.65 2.00	V V V V
	Drain-source on-state resistance @ $V_{GS} = 10\text{V}$ $I_D = 14.0\text{A}$ IRF150 $I_D = 10.0\text{A}$ IRF250 $I_D = 5.5\text{A}$ IRF350 $I_D = 5.0\text{A}$ IRF450	$r_{DS(on)(1)}$	- - - -	0.055 0.085 0.3 0.4	Ω Ω Ω Ω
	Drain-source on-state resistance @ $T_C = 125^{\circ}\text{C}$ $I_D = 14.0\text{A}$ IRF150 $I_D = 10.0\text{A}$ IRF250 $I_D = 5.5\text{A}$ IRF350 $I_D = 5.0\text{A}$ IRF450	$r_{DS(on)(2)}$	- - - -	0.083 0.153 0.6 0.8	Ω Ω Ω Ω
+ 5.9	Small signal common source, capacitance @ $f = 1\text{MHz}$, $V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$				
+ 5.9.2	Output capacitance IRF150 IRF250 IRF350 IRF450	C_{22ss}	- - - -	1500 1200 900 800	pF pF pF pF
+ 5.9.3	Reverse transfer capacitance IRF150 IRF250 IRF350 IRF450	C_{12ss}	- - - -	500 500 400 400	pF pF pF pF

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5: CHARACTERISTICS

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CECC 50012 REFERENCE	PARAMETER AND TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
+ 5.10	Switching times @ $V_{GS(on)} = 10\text{V}$				
	Turn-on delay time	$t_{d(on)}$			
	$I_D = 14.0\text{A}, V_{DD} = 50\text{V}$ IRF150		-	60	ns
	$I_D = 10.0\text{A}, V_{DD} = 100\text{V}$ IRF250		-	40	ns
	$I_D = 5.5\text{A}, V_{DD} = 200\text{V}$ IRF350		-	60	ns
	$I_D = 5.0\text{A}, V_{DD} = 250\text{V}$ IRF450		-	60	ns
	Rise time	t_r			
	$I_D = 14.0\text{A}, V_{DD} = 50\text{V}$ IRF150		-	200	ns
	$I_D = 10.0\text{A}, V_{DD} = 100\text{V}$ IRF250		-	200	ns
	$I_D = 5.5\text{A}, V_{DD} = 200\text{V}$ IRF350		-	150	ns
	$I_D = 5.0\text{A}, V_{DD} = 250\text{V}$ IRF450		-	100	ns
	Fall time	t_f			
	$I_D = 14.0\text{A}, V_{DD} = 50\text{V}$ IRF150		-	200	ns
	$I_D = 10.0\text{A}, V_{DD} = 100\text{V}$ IRF250		-	200	ns
	$I_D = 5.5\text{A}, V_{DD} = 200\text{V}$ IRF350		-	150	ns
	$I_D = 5.0\text{A}, V_{DD} = 250\text{V}$ IRF450		-	140	ns
SECTION 1 AND 3 + 5.11	Turn-off delay time	$t_{d(off)}$			
	$I_D = 14.0\text{A}, V_{DD} = 50\text{V}$ IRF150		-	300	ns
	$I_D = 10.0\text{A}, V_{DD} = 100\text{V}$ IRF250		-	250	ns
	$I_D = 5.5\text{A}, V_{DD} = 200\text{V}$ IRF350		-	400	ns
	$I_D = 5.0\text{A}, V_{DD} = 250\text{V}$ IRF450		-	300	ns
	See Appendix II for test circuit				
	Thermal resistance, junction to ambient	$R_{th(j-amb)}$	-	30	K/W
	Thermal resistance, junction to case	$R_{th(j-case)}$	-	0.83	K/W
	Single Pulse Avalanche Energy	E_{AS}			
	$I_L = 41\text{A}, V_{DD} = 60\text{V}, L = 770\mu\text{H}$ IRF150		-	1294	mJ
	$I_L = 30\text{A}, V_{DD} = 60\text{V}, L = 1.5\text{mH}$ IRF250		-	913	mJ
	$I_L = 15\text{A}, V_{DD} = 60\text{V}, L = 3.1\text{mH}$ IRF350		-	401	mJ
	$I_L = 13\text{A}, V_{DD} = 75\text{V}, L = 9.2\text{mH}$ IRF450		-	892	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 50012-070) 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:-

IRF150 to CECC 50012-070 Issue 1 August 1993 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.

11: E_{AS} TESTING

The testing of E_{AS} shown on page 4 is part of 100% testing carried out in production.

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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 @ $T_{case} = 25^{\circ}C$ UNLESS OTHERWISE STATED		INSPECTION REQUIREMENTS			
				LIMITS			LEVEL E
				MIN	MAX	UNIT	AQL
SUBGROUP A1							I
Visual inspection	4.2.1						0.65
SUBGROUP A2a							II
Non-operative $I_{GSS(1)}$	4.3.4 T-071	Short or open circuit $V_{GSR} = 20V$		-	100	nA	0.15
$V_{GS(TO)(1)}$	4.3.4 T-075	$V_{DS} = V_{GS}$ $I_D = 250\mu A$		2.0	4.0	V	
SUBGROUP A2b							II
Leakage current $I_{GSS(1)}$	4.3.4 T-071	$V_{GSR} = 20V$ $V_{DS} = 0V$		-	100	nA	0.4
Drain cut off current $I_{DSX(1)}$	4.3.4 T-073	$V_{GS} = 0V$					
		$V_{DS} = 100V$ IRF150	-	250	μA		
		$V_{DS} = 200V$ IRF250	-	250	μA		
		$V_{DS} = 400V$ IRF350	-	250	μA		
		$V_{DS} = 500V$ IRF450	-	250	μA		
Gate source threshold voltage $V_{GS(TO)(1)}$	4.3.4 T-075	$V_{DS} = V_{GS}$ $I_D = 250\mu A$		2.0	4.0	V	
Drain current I_D pulsed	4.3.4 T-072	$V_{GS} = 7V$ $V_{DS} = 10V$					
		IRF150	12.0	100.0	A		
		IRF250	16.0	116.0	A		
		IRF350	10.0	97.0	A		
		IRF450	12.0	100.0	A		