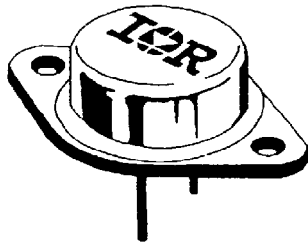


BRITISH STANDARDS INSTITUTION 2 Park Street, London W1A 2BS	BS CECC 50012-078 Issue 1 August 1993 Page 1 of 19																																																										
Electronic Components of Assessed Quality in accordance with CECC 50000, Issue 4.																																																											
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, P Channel, enhanced gate. Type Numbers IRF9130 IRF9230																																																										
Tel: (0883) 713215. Tlx:95219. Fax: (0883) 714234.	ORDERING INFORMATION:- See Clause 7 of this document																																																										
1: MECHANICAL DESCRIPTION CAUTION: Static Sensitive Devices, see Clause 9.  <u>Outline:</u> 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.	2: Semiconductor Material : Silicon. Encapsulation : Hermetically Sealed Metal Can. Application : a. Low frequency amplification. : b. Switching. Power : Case rated : 75W @ $T_{case} = 25^{\circ}C$																																																										
	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.																																																											
<table border="1"> <thead> <tr> <th rowspan="2">CECC 50012 REFERENCE</th> <th rowspan="2"></th> <th rowspan="2">SYMBOL</th> <th colspan="3">VALUE</th> </tr> <tr> <th>MIN</th> <th>MAX</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>4.1</td> <td>Operating temperature range</td> <td>T_{case}</td> <td>-55</td> <td>+150</td> <td>$^{\circ}C$</td> </tr> <tr> <td>4.2</td> <td>Storage temperature range</td> <td>T_{stg}</td> <td>-55</td> <td>+150</td> <td>$^{\circ}C$</td> </tr> <tr> <td>4.3</td> <td>Drain-source voltage at $V_{GS} = 0$ $T_J = 25^{\circ}C$ to $150^{\circ}C$</td> <td>$-V_{DSS}$</td> <td>-</td> <td>100 200</td> <td>V V</td> </tr> <tr> <td>4.4</td> <td>Reverse gate-source voltage at $V_{DS} = 0$</td> <td>V_{GSR}</td> <td>-</td> <td>20</td> <td>V</td> </tr> <tr> <td>4.5</td> <td>Gate-drain voltage with source open circuit</td> <td>$-V_{GDO}$</td> <td>-</td> <td>20</td> <td>V</td> </tr> <tr> <td>4.7</td> <td>Continuous drain current @ $T_{case} = 25^{\circ}C$</td> <td>$-I_D$</td> <td>-</td> <td>12.0 6.5</td> <td>A A</td> </tr> <tr> <td>4.7.1</td> <td>Pulsed drain current @ $T_{case} = 25^{\circ}C$</td> <td>$-I_{DM}$</td> <td>-</td> <td>48.0 26.0</td> <td>A A</td> </tr> <tr> <td>4.8</td> <td>Power dissipation (see derating curve page 15) $T_{case} = 25^{\circ}C$</td> <td>P_{tot}</td> <td>-</td> <td>75</td> <td>W</td> </tr> </tbody> </table>	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 @ $T_{case} = 25^{\circ}C$	$-I_D$	-	12.0 6.5	A A	4.7.1	Pulsed drain current @ $T_{case} = 25^{\circ}C$	$-I_{DM}$	-	48.0 26.0	A A	4.8	Power dissipation (see derating curve page 15) $T_{case} = 25^{\circ}C$	P_{tot}	-	75	W		
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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 @ 125°C , $-V_{DS} = -V_{GS}$, $-I_D = 250\mu\text{A}$ $T_{case} =$	$-V_{GS(TO)(2)}$	1.0	-	V
+ 5.5.2	Gate-source threshold voltage @ -55°C , $-V_{DS} = -V_{GS}$, $-I_D = 250\mu\text{A}$ $T_{case} =$	$-V_{GS(TO)(3)}$	-	5.0	V
+ 5.6	On-state drain current @ $-V_{GS} = 7\text{V}$, $-V_{DS} = 10\text{V}$ IRF9130 IRF9230	$-I_D$	8.0 3.0	35.0 25.0	A A
+ 5.7	Input capacitance, $f = 1\text{ MHz}$, $-V_{DS} = 25\text{V}$, $-V_{GS} = 0\text{V}$ IRF9130 IRF9230	C_{11ss}	- -	950 850	pF pF
+ 5.9	Short circuit forward transconductance @ $-V_{DS} = 10\text{V}$ $-I_D = 6.5\text{A}$ IRF9130 $-I_D = 3.5\text{A}$ IRF9230 Pulse conditions $t_p < 300\mu\text{s}$, duty cycle $< 2\%$. See Appendix II for test circuit.	g_{21s}	3.0 2.0	9.0 6.0	S S

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Issue 1

5: CHARACTERISTICS

 $T_{case} = 25^{\circ}\text{C}$ 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 @ $V_{GS} = 0\text{V}$ - $V_{DS} = 100\text{V}$ IRF9130 - $V_{DS} = 200\text{V}$ IRF9230	$-I_{DSX(1)}$	-	250	μA
+ 5.7.1	Drain cut-off current @ $V_{GS} = 0\text{V}$, $T_C = 125^{\circ}\text{C}$ - $V_{DS} = 80\text{V}$ IRF9130 - $V_{DS} = 160\text{V}$ IRF9230	$-I_{DSX(2)}$	-	1.0	mA
+ 5.8	Drain-source on-state voltage @ $V_{GS} = -10\text{V}$ - $I_D = 11.0\text{A}$ IRF9130 - $I_D = 6.5\text{A}$ IRF9230	$-V_{DS(on)}$	-	4.0	V
	Drain-Source on state resistance @ $-V_{GS} = 10\text{V}$ Derived from $V_{DS(on)}$ - $I_D = 6.5\text{A}$ IRF9130 - $I_D = 3.5\text{A}$ IRF9230	$r_{DS(on)(1)}$	-	0.30	Ω
	Drain-Source on state resistance @ $T_{case} = 125^{\circ}\text{C}$ - $I_D = 6.5\text{A}$ IRF9130 - $I_D = 3.5\text{A}$ IRF9230	$r_{DS(on)(2)}$	-	0.49	Ω
+ 5.9	Small signal common source, capacitance @ $f = 1\text{MHz}$, $-V_{DS} = 25\text{V}$, $-V_{GS} = 0\text{V}$	C_{22ss}	-	450	pF
+ 5.9.2	Output capacitance IRF9130 IRF9230				
+ 5.9.3	Reverse transfer capacitance IRF9130 IRF9230	C_{12ss}	-	200	pF

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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
+ 5.10	Switching times @ $-V_{\text{GS(on)}} = 10\text{V}$				
	Turn-on delay time $-I_{\text{D}} = 6.5\text{A}, -V_{\text{DD}} = 26\text{V}$ IRF9130 $-I_{\text{D}} = 3.5\text{A}, -V_{\text{DD}} = 26\text{V}$ IRF9230	$t_{\text{d(on)}}$	- -	60 50	ns ns
	Rise time $-I_{\text{D}} = 6.5\text{A}, -V_{\text{DD}} = 26\text{V}$ IRF9130 $-I_{\text{D}} = 3.5\text{A}, -V_{\text{DD}} = 26\text{V}$ IRF9230	t_{r}	- -	140 100	ns ns
	Fall time $-I_{\text{D}} = 6.5\text{A}, -V_{\text{DD}} = 26\text{V}$ IRF9130 $-I_{\text{D}} = 3.5\text{A}, -V_{\text{DD}} = 26\text{V}$ IRF9230	t_{f}	- -	140 80	ns ns
+ 5.11	Turn-off delay time $-I_{\text{D}} = 6.5\text{A}, -V_{\text{DD}} = 26\text{V}$ IRF9130 $-I_{\text{D}} = 3.5\text{A}, -V_{\text{DD}} = 26\text{V}$ IRF9230 See Appendix II for test circuit	$t_{\text{d(off)}}$	- -	140 100	ns ns
	Thermal resistance, junction to ambient Thermal resistance, junction to case	$R_{\text{th(j-amb)}}$ $R_{\text{th(j-case)}}$	- -	30 1.67	K/W K/W
	Single Pulse Avalanche Energy	E_{AS}			
	$-I_{\text{L}} = 12\text{A}, -V_{\text{DD}} = 25\text{V}, L = 0.38\text{mH}$ IRF9130 $-I_{\text{L}} = 6\text{A}, -V_{\text{DD}} = 50\text{V}, L = 5.6\text{mH}$ IRF9230		- -	35 127	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).
5. 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:-

6. This detail specification number (CECC 50012-078) followed by the letter defining the level of assessment and, if applicable the letter identifying the screening sequence.
7. 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). See CECC 50000 App.VI.

Example:-

IRF9130 to CECC 50012-078 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. |

9: RECOMMENDED HANDLING PRECAUTIONS: STATIC SENSITIVE DEVICES

To prevent damage by static discharge to these devices during handling, the procedures specified in CECC 00015 'Protection of Electrostatic 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			LEVEL E	
			LIMITS			IL	AQL
			MIN	MAX	UNIT		
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	$-V_{DS} = -V_{GS}$ $-I_D = 250\mu A$	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	$-V_{GS} = 0V$					
		$-V_{DS} = 100V$ IRF9130	-	250	μA		
		$-V_{DS} = 200V$ IRF9230	-	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	$-V_{GS} = 7V$					
		$-V_{DS} = 10V$ IRF9130	8.0	35.0	A		
		$-V_{DS} = 10V$ IRF9230	3.0	25.0	A		