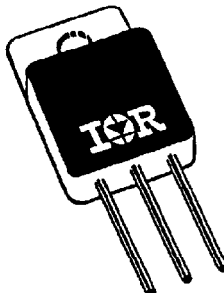


BRITISH STANDARDS INSTITUTION 2 Park Street, London W1A 2BS	BS CECC 50012-065 Issue 1 October 1990 Page 1 of 19 Reprinted January, 1991																																																																						
Electronic Components of Assessed Quality in accordance with CECC 50000, Issue 3.																																																																							
Specification available from:- As shown in PD 9002, CECC 00200 and INTERNATIONAL RECTIFIER CO (GB) LTD Hurst Green, Oxted, Surrey RH8 9BB.	DETAIL SPECIFICATION FOR:- Single Gate Field Effect Transistor, P Channel, enhanced gate. Type Numbers IRFY9140(M) IRFY9240(M)																																																																						
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.	ORDERING INFORMATION:- See Clause 7 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.																																																																							
<table border="1"> <thead> <tr> <th data-bbox="212 1144 371 1245" rowspan="2">CECC 50012 REFERENCE</th> <th data-bbox="371 1144 946 1245" rowspan="2"></th> <th data-bbox="946 1144 1070 1245" rowspan="2">SYMBOL</th> <th colspan="3" data-bbox="1070 1144 1329 1189">VALUE</th> </tr> <tr> <th data-bbox="1070 1200 1161 1245">MIN</th> <th data-bbox="1161 1200 1262 1245">MAX</th> <th data-bbox="1262 1200 1329 1245">UNIT</th> </tr> </thead> <tbody> <tr> <td data-bbox="212 1245 371 1290">4.1</td> <td data-bbox="371 1245 946 1290">Operating temperature range</td> <td data-bbox="946 1245 1070 1290">T_{case}</td> <td data-bbox="1070 1245 1161 1290">-55</td> <td data-bbox="1161 1245 1262 1290">+150</td> <td data-bbox="1262 1245 1329 1290">$^{\circ}C$</td> </tr> <tr> <td data-bbox="212 1290 371 1335">4.2</td> <td data-bbox="371 1290 946 1335">Storage temperature range</td> <td data-bbox="946 1290 1070 1335">T_{stg}</td> <td data-bbox="1070 1290 1161 1335">-55</td> <td data-bbox="1161 1290 1262 1335">+150</td> <td data-bbox="1262 1290 1329 1335">$^{\circ}C$</td> </tr> <tr> <td data-bbox="212 1335 371 1458" rowspan="2">4.3</td> <td data-bbox="371 1335 946 1458" rowspan="2">Drain-source voltage at $V_{GS} = 0$ $T_J = 25^{\circ}C$ to $150^{\circ}C$ IRFY9140(M) IRFY9240(M)</td> <td data-bbox="946 1335 1070 1458" rowspan="2">$-V_{DSS}$</td> <td data-bbox="1070 1335 1161 1379">-</td> <td data-bbox="1161 1335 1262 1379">100</td> <td data-bbox="1262 1335 1329 1379">V</td> </tr> <tr> <td data-bbox="1070 1379 1161 1424">-</td> <td data-bbox="1161 1379 1262 1424">200</td> <td data-bbox="1262 1379 1329 1424">V</td> </tr> <tr> <td data-bbox="212 1458 371 1503">4.4</td> <td data-bbox="371 1458 946 1503">Reverse gate-source voltage at $V_{DS} = 0$</td> <td data-bbox="946 1458 1070 1503">V_{GSR}</td> <td data-bbox="1070 1458 1161 1503">-</td> <td data-bbox="1161 1458 1262 1503">20</td> <td data-bbox="1262 1458 1329 1503">V</td> </tr> <tr> <td data-bbox="212 1503 371 1547">4.5</td> <td data-bbox="371 1503 946 1547">Gate-drain voltage with source open circuit</td> <td data-bbox="946 1503 1070 1547">$-V_{GDO}$</td> <td data-bbox="1070 1503 1161 1547">-</td> <td data-bbox="1161 1503 1262 1547">20</td> <td data-bbox="1262 1503 1329 1547">V</td> </tr> <tr> <td data-bbox="212 1547 371 1682" rowspan="2">4.7</td> <td data-bbox="371 1547 946 1682" rowspan="2">Continuous drain current @ $T_{case} = 25^{\circ}C$ IRFY9140(M) IRFY9240(M)</td> <td data-bbox="946 1547 1070 1682" rowspan="2">$-I_D$</td> <td data-bbox="1070 1547 1161 1592">-</td> <td data-bbox="1161 1547 1262 1592">13.0</td> <td data-bbox="1262 1547 1329 1592">A</td> </tr> <tr> <td data-bbox="1070 1592 1161 1637">-</td> <td data-bbox="1161 1592 1262 1637">7.7</td> <td data-bbox="1262 1592 1329 1637">A</td> </tr> <tr> <td data-bbox="212 1682 371 1805" rowspan="2">4.71</td> <td data-bbox="371 1682 946 1805" rowspan="2">Pulsed drain current @ $T_{case} = 25^{\circ}C$ IRFY9140(M) IRFY9240(M)</td> <td data-bbox="946 1682 1070 1805" rowspan="2">$-I_{DM}$</td> <td data-bbox="1070 1682 1161 1727">-</td> <td data-bbox="1161 1682 1262 1727">52.0</td> <td data-bbox="1262 1682 1329 1727">A</td> </tr> <tr> <td data-bbox="1070 1727 1161 1771">-</td> <td data-bbox="1161 1727 1262 1771">30.8</td> <td data-bbox="1262 1727 1329 1771">A</td> </tr> <tr> <td data-bbox="212 1805 371 1895">4.8</td> <td data-bbox="371 1805 946 1895">Power dissipation (see derating curve page 15) $T_{case} = 25^{\circ}C$</td> <td data-bbox="946 1805 1070 1895">P_{tot}</td> <td data-bbox="1070 1805 1161 1895">-</td> <td data-bbox="1161 1805 1262 1895">60</td> <td data-bbox="1262 1805 1329 1895">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 $150^{\circ}C$ IRFY9140(M) IRFY9240(M)	$-V_{DSS}$	-	100	V	-	200	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 @ $T_{case} = 25^{\circ}C$ IRFY9140(M) IRFY9240(M)	$-I_D$	-	13.0	A	-	7.7	A	4.71	Pulsed drain current @ $T_{case} = 25^{\circ}C$ IRFY9140(M) IRFY9240(M)	$-I_{DM}$	-	52.0	A	-	30.8	A	4.8	Power dissipation (see derating curve page 15) $T_{case} = 25^{\circ}C$	P_{tot}	-	60	W					
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 $150^{\circ}C$ IRFY9140(M) IRFY9240(M)	$-V_{DSS}$	-	100	V																																																																		
			-	200	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 @ $T_{case} = 25^{\circ}C$ IRFY9140(M) IRFY9240(M)	$-I_D$	-	13.0	A																																																																		
			-	7.7	A																																																																		
4.71	Pulsed drain current @ $T_{case} = 25^{\circ}C$ IRFY9140(M) IRFY9240(M)	$-I_{DM}$	-	52.0	A																																																																		
			-	30.8	A																																																																		
4.8	Power dissipation (see derating curve page 15) $T_{case} = 25^{\circ}C$	P_{tot}	-	60	W																																																																		
See the relevant Qualified Products List for the availability of Components qualified under this detail specification																																																																							

CECC 50012-065
Issue 1

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 @ $-V_{GS} = 10\text{V}$, $-V_{DS} = 10\text{V}$ IRFY9140(M) $-V_{DS} = 10\text{V}$ IRFY9240(M)	$-I_D$	13.0 7.7	- -	A A
+ 5.7	Input capacitance, $f = 1\text{ MHz}$, $-V_{DS} = 25\text{V}$, $-V_{GS} = 0\text{V}$ IRFY9140(M) IRFY9240(M)	C_{11ss}	- -	1300 1300	pF pF
+ 5.9	Short circuit forward transconductance @ $V_{DS} = -25\text{V}$ $-I_D = 10.0\text{A}$ IRFY9140(M) $-I_D = 6.0\text{A}$ IRFY9240(M) Pulse conditions $t_p < 300\mu\text{s}$, duty cycle $< 2\%$. See Appendix II for test circuit.	g_{21s}	5.0 4.0	- -	S S

CECC 50012-065
Issue 1

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					
+ 5.7	Drain cut-off current @ $V_{\text{GS}} = 0\text{V}$ $-V_{\text{DS}} = 100\text{V}$ IRFY9140(M) $-V_{\text{DS}} = 200\text{V}$ IRFY9240(M)	$-I_{\text{DSX}(1)}$	-	250 250	μA μA
+ 5.7.1	Drain cut-off current @ $V_{\text{GS}} = 0\text{V}$, $T_{\text{C}} = 125^{\circ}\text{C}$ $-V_{\text{DS}} = 80\text{V}$ IRFY9140(M) $-V_{\text{DS}} = 160\text{V}$ IRFY9240(M)	$-I_{\text{DSX}(2)}$	-	1.0 1.0	mA mA
+ 5.8	Drain-source on-state voltage @ $V_{\text{GS}} = -10\text{V}$ $-I_{\text{D}} = 10.0\text{A}$ IRFY9140(M) $-I_{\text{D}} = 6.0\text{A}$ IRFY9240(M)	$-V_{\text{DS(on)}}$	-	2.10 3.00	V V
+ 5.9	Small signal common source, capacitance @ $f = 1\text{MHz}$, $-V_{\text{DS}} = 25\text{V}$, $-V_{\text{GS}} = 0\text{V}$	$C_{22\text{ss}}$	-	700 450	pF pF
+ 5.9.2	Output capacitance IRFY9140(M) IRFY9240(M)				
+ 5.9.3	Reverse transfer capacitance IRFY9140(M) IRFY9240(M)	$C_{12\text{ss}}$	-	400 250	pF pF
+ 5.10	Switching times @ $-V_{\text{GS(on)}} = 10\text{V}$	$t_{\text{d(on)}}$	-	45 45	ns ns
	Turn-on delay time $-I_{\text{D}} = 10.0\text{A}$, $-V_{\text{DD}} = 50\text{V}$ IRFY9140(M) $-I_{\text{D}} = 6.0\text{A}$, $-V_{\text{DD}} = 100\text{V}$ IRFY9240(M)				
	Rise time $-I_{\text{D}} = 10.0\text{A}$, $-V_{\text{DD}} = 50\text{V}$ IRFY9140(M) $-I_{\text{D}} = 6.0\text{A}$, $-V_{\text{DD}} = 100\text{V}$ IRFY9240(M)	t_{r}	-	150 150	ns ns

CECC 50012-065
Issue 1

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	t_f			
	$-I_D = 10.0\text{A}, -V_{DD} = 50\text{V}$ IRFY9140(M) $-I_D = 6.0\text{A}, -V_{DD} = 100\text{V}$ IRFY9240(M)		-	120	ns
			-	120	ns
	Turn-off delay time	$t_{d(off)}$			
	$-I_D = 10.0\text{A}, -V_{DD} = 50\text{V}$ IRFY9140(M) $-I_D = 6.0\text{A}, -V_{DD} = 100\text{V}$ IRFY9240(M)		-	200	ns
			-	180	ns
	See Appendix II for test circuit				
SECTION 1 AND 3					
+ 5.11	Thermal resistance, junction to ambient Thermal resistance, junction to case	$R_{th(j-amb)}$ $R_{th(j-case)}$	- -	80 2.1	K/W K/W
	D.C. Isolation voltage, terminals to case (All terminals shorted)	V_{INS}	1000	-	V

CECC 50012-065
Issue 1

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 50012-065) 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 50012-065 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.

11: V_{INS} TESTING

The testing of V_{INS} shown in section 5 is part of 100% testing carried out in production.

CECC 50012-065
Issue 1

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	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 $V_{GSR} = 20V$ $-V_{DS} = 20V$	- 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 $-I_D$	4.3.4 T-071 4.3.4 T-073 4.3.4 T-075 4.3.4 T-072	$V_{GSR} = 20V$ $-V_{DS} = 0V$ $-V_{GS} = 0V$ $-V_{DS} = 100V$ IRFY9140(M) $-V_{DS} = 200V$ IRFY9240(M) $-V_{DS} = 20V$ $-I_D = 250\mu A$ $-V_{GS} = 7V$ $-V_{DS} = 5V$ IRFY9140(M) $-V_{DS} = 5V$ IRFY9240(M)	- 2.0 2.0 3.0 3.0	100 250 250 4.0 52.0 30.6	nA μA μA V A A	II	0.4