INTERNATIONAL STANDARD

IEC 60747-4-1

QC 750115

First edition
2000-06

Semiconductor devices – Discrete devices –

Part 4-1:
Microwave diodes and transistors – Microwave field effect transistors – Blank detail specification

Dispositifs à semiconducteurs – Dispositifs discrets –

Partie 4-1:
Diodes et transistors hyperfréquences – Transistors hyperfréquences à effet de champ – Spécification particulière-cadre

Reference number
IEC 60747-4-1:2000(E)

Numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series.

Consolidated publications

Consolidated versions of some IEC publications including amendments are available. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Validity of this publication

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology.

Information relating to the date of the reconfirmation of the publication is available in the IEC catalogue.

Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is to be found at the following IEC sources:

- **IEC web site***
- **Catalogue of IEC publications**
  Published yearly with regular updates
  (On-line catalogue)*
- **IEC Bulletin**
  Available both at the IEC web site* and as a printed periodical

Terminology, graphical and letter symbols

For general terminology, readers are referred to IEC 60050: *International Electrotechnical Vocabulary* (IEV).

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams*.

* See web site address on title page.

INTERNATIONAL STANDARD

IEC 60747-4-1

QC 750115

First edition
2000-06

Semiconductor devices – Discrete devices –

Part 4-1:
Microwave diodes and transistors –
Microwave field effect transistors –
Blank detail specification

Dispositifs à semiconducteurs – Dispositifs discrets –

Partie 4-1:
Diodes et transistors hyperfréquences –
Transistors hyperfréquences à effet de champ –
Spécification particulière-cadre

International Electrotechnical Commission 3, rue de Varembé Geneva, Switzerland
Telefax: +41 22 919 0300 e-mail: inmail@iec.ch IEC web site http://www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE Q

For price, see current catalogue

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

SEMICONDUCTOR DEVICES – DISCRETE DEVICES –

Part 4-1: Microwave diodes and transistors – Microwave field effect transistors – Blank detail specification

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60747-4-1 has been prepared by subcommittee 47E: Discrete semiconductor devices, of IEC technical committee 47: Semiconductor devices.

The text of this standard is based on the following documents:

FDIS	Report on voting
47E/145/FDIS	47E/154/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annex A forms an integral part of this standard.

The QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ).

Other IEC publications quoted in this standard:

Publication Nos. IEC 60191-2:1966, *Mechanical standardization of semiconductor devices – Part 2: Dimensions*

IEC 60747-8-1:1987, *Semiconductor devices – Discrete devices – Part 8: Field-effect transistors – Section One: Blank detail specification for single-gate field-effect transistors up to 5 W and 1 GHz*

IEC 60747-10:1991, *Semiconductor devices – Part 10: Generic specification for discrete devices and integrated circuits*

IEC 70747-11:1985, *Semiconductor devices – Part 11: Sectional specification for discrete devices*

IEC 60749:1996, *Semiconductor devices – Mechanical and climatic test methods*

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this standard may be issued at a later date.

SEMICONDUCTOR DEVICES – DISCRETE DEVICES –

Part 4-1: Microwave diodes and transistors – Microwave field effect transistors – Blank detail specification

INTRODUCTION

The IEC Quality Assessment for Electronic Components is operated in accordance with the statutes of the IEC and under the authority of the IEC. The object of this system is to define quality assessment procedures in such a manner that electronic components released by one participating country as conforming with the requirements of an applicable specification are equally acceptable in all other participating countries without the need for further testing.

This blank detail specification is one of a series of blank detail specifications for semiconductor devices and shall be used with the following IEC publications:

– 60747-10/QC 700000: *Semiconductor devices – Part 10: Generic specification for discrete devices and integrated circuits*.

– 60747-11/QC 750100: *Semiconductor devices – Part 11: Sectional specification for discrete devices.*

Required information

Numbers shown in square brackets on this and the following pages correspond to the following items of required information, which shall be entered in the spaces provided.

Identification of the detail specification

[1] The name of the National Standards Organization under whose authority the detail specification is issued.

[2] The IECQ number of the detail specification.

[3] The numbers and issue numbers of the generic and sectional specifications.

[4] The national number of the detail specification, date of issue and any further information required by the national system.

Identification of the component

[5] Type of component.

[6] Information on typical construction and applications. If a device is designed to satisfy several applications, this shall be stated here. Characteristics, limits and inspection requirements for these applications shall be met.

If a device is electrostatic sensitive, or contains hazardous materials, for example beryllium oxide, a caution statement shall be added in the detail specification.

[7] Outline drawing and/or reference to the relevant standard for outlines.

[8] Category of assessed quality.

[9] Reference data on the most important properties to permit comparison between component types.

……

[Throughout this standard, the texts given in square brackets are intended for guidance to the specification writer and shall not be included in the detail specification.]

[Throughout this standard, when a characteristic or rating applies, "X" denotes that a value shall be inserted in the detail specification.]

[Name (address) of responsible NAI (and possibly of body from which specification is available.] [1]	[Number of IECQ detail specification, plus issue number and/or date.] [2] QC 750115
ELECTRONIC COMPONENT OF ASSESSED QUALITY IN ACCORDANCE WITH [3] Generic specification: Publication IEC 60747-10/QC 700000 Sectional specification: Publication IEC 60747-11/QC 750000 [and national references if different.]	National number of detail specification. [4] [This box need not be used if national number repeats IECQ number.]
BLANK DETAIL SPECIFICATION FOR MICROWAVE FIELD EFFECT TRANSISTORS [5] [Type number(s) of the relevant device(s).] Ordering information: see clause 7 of this standard.	
1 Mechanical description	**2 Short description**
Outline references: [7] IEC 60191-2 ..... [mandatory if available] and/or national [if there is no IEC outline.] *Outline drawing*: [may be transferred to or given with more details in clause 10 of this standard.] *Terminal identification* [drawing showing pin assignments, including graphical symbols.] *Marking*: [letters and figures, or colour code.] [The detail specification shall prescribe the information to be marked on the device, if any] [See 2.5 of generic specification and/or clause 6 of this standard.] [Polarity indication, if special method is used.]	Microwave field effect transistors [6] Semiconductor material: [GaAs] Encapsulation: [cavity or non-cavity]. Application(s): see clause 5 of this standard. Caution: Observe precautions for handling ELECTROSTATIC SENSITIVE DEVICES. [if applicable] **3 Categories of assessed quality** [from 2.6 of the generic specification.] [8] Reference data [9]
Information about manufacturers who have components qualified to this detail specification is available in the current Qualified Products List.	

4 Limiting values (absolute maximum rating system) common to all applications

These values apply over the operating temperature range, unless otherwise specified.

[Repeat only subclause numbers used, with title. Any additional values shall be given at the appropriate place, but without subclause number(s).]

[Curves should preferably be given under clause 10 of this standard.]

Categories type A: power device

Categories type B: low-noise device

Sub-clause	Limiting values	Letter symbols	Type A		Type B	
			Min.	Max.	Min.	Max.
4.1	Ambient or case temperature	$T_{amb/case}$	×	×	×	×
4.2	Storage temperature	T_{stg}	×	×	×	×
4.3	Drain-source voltage under specified conditions	V_{DSX} or V_{DSS} or V_{DSR}		×		×
4.4	Gate-source reverse voltage	V_{GSR}		×		×
4.5	Gate-drain voltage with source open-circuited	V_{GDO}		×		×
4.6	Drain current	I_D		×		×
4.7	Channel temperature	T_{ch} or T_j		×		×
4.8	Total power dissipation (see note)	P_{tot}		×		×

NOTE Maximum value over the specified range of operating ambient or reference-point temperatures. Any special requirements for ventilation and/or mounting shall be stated.

5 Electrical characteristics

See clause 8 of this standard for inspection requirements.

[Repeat only subclause numbers used, with title. Any additional characteristics shall be given at the appropriate place but without subclause number.]

[When several devices are defined in the same detail specification, the relevant values shall be given on successive lines, avoiding repeating identical values.]

[Curves should preferably be given under clause 10 of this standard.]

Subclause	Characteristics and conditions at T_{amb} or T_{case} = 25 °C unless otherwise specified (see clause 4 of the generic specification)	Letter symbols	Values				Tested
			Type A		Type B		
			Min.	Max.	Min.	Max.	
5.1	Drain current with gate short-circuited to source: value at specified V_{DS}	I_{DSS}	×	×	×	×	A2b
5.2	Gate-source cut-off voltage: value at specified V_{DS} and I_{DS}	V_{GSoff}	×	×	×	×	A2b
5.3	Gate-source breakdown voltage: value at specified I_G or	$V_{(BR)GS}$	×		×		A2b
	gate cut-off current, with drain short-circuited to source: value at specified V_{GS}	I_{GSS}		×		×	A2b
5.4	Thermal resistance channel to case: value at specified T_{case} and I_G	$R_{th(j-c)}$		×			C2d
5.5	Output power at 1 dB-gain compression: value at specified f, V_{DS} and I_{DS} or	$P_{o(1dB)}$	×				A4
	output power: value at specified f, V_{DS}, I_{DS} and P_{in}	P_o	×				A4
5.6	Power gain at 1 dB-gain compression: value at specified f, V_{DS} and I_{DS} (see note)	$G_{p(1dB)}$	×				A4
5.7	Power added efficiency: value at specified f, V_{DS}, I_{DS} and P_{in}	η_{add}	×				A4
5.8	Noise figure: value at specified f, V_{DS} and I_{DS}	F				×	A4
5.9	Associated gain: value at specified f, V_{DS} and I_{DS}	G_{as}			×		A4
5.10	Maximum frequency of oscillation: value at specified f, V_{DS} and I_{DS}	f_{max}			×		C2a
5.11	Maximum available gain: value at specified f, V_{DS} and I_{DS}	$G_{a(max)}$			×		C2a
5.12	Amplitudes and angles of S-parameter: values at specified f, V_{DS} and I_{DS}, where appropriate	s_{11amp}	×	×	×	×	C2a
		s_{11ang}	×	×	×	×	
		s_{12amp}	×	×	×	×	
		s_{12ang}	×	×	×	×	
		s_{21amp}	×	×	×	×	
		s_{21ang}	×	×	×	×	
		s_{22amp}	×	×	×	×	
		s_{22ang}	×	×	×	×	

NOTE Power gain at 1 dB-gain compression can be omitted if using output power at specified input power.

6 Marking

[Any particular information other than given in box [7] (clause 1) and/or 2.5 of the generic specification shall be given here.]

7 Ordering information

[The following minimum information is necessary to order a specific device, unless otherwise specified:

– precise type reference (and nominal voltage value, if required);
– IECQ reference of the detail specification with issue number and/or date when relevant;
– category of assessed quality as defined in 3.7 of the sectional specification and, if required, screening sequence as defined in 3.6 of the sectional specification;
– any other particulars.]

8 Test conditions and inspection requirements

[These are given in the following tables, where the values and exact test conditions to be used shall be specified as required for a given type, and as required by the relevant test in the relevant publication. Only those characteristics listed in clause 5 for the given application(s) shall be tested.]

[The choice between alternative tests or test methods shall be made when a detail specification is written.]

[When several devices are included in the same detail specification, the relevant conditions and/or values should be given on successive lines, where possible avoiding repetition or identical conditions and/or values.]

Throughout the following text, reference to subclause numbers is made with respect to the generic specification unless otherwise stated and test methods are quoted from clause 4 of the sectional specification.

[For sampling requirements, either refer to or reproduce values of 3.7 of the sectional specification, according to applicable category(ies) of assessed quality.]

[For group A, the choice between AQL or LTPD system shall be made in the detail specification.]

GROUP A

Lot by lot tests

All tests are non-destructive (3.6.6)

Inspection or test	Letter symbols	Reference	Conditions at T_{amb} or T_{case} = 25 °C unless otherwise specified (see clause 4 of the generic specification)	Inspection requirement limits			
				Type A		Type B	
				Min.	Max.	Min.	Max.
Sub-group A1 External visual examination		IEC 60747-10, 4.2.1.1					
Sub-group A2a Inoperative devices				Short-circuit: V_{GSoff} > [3 V_{GSoff}max.] or: I_{GS} > [10 I_{GS}max.] Open-circuit: V_{GSoff} < [0,1 V_{GSoff}min.]			
Sub-group A2b			See clause 5				
Drain current with gate short-circuited to source	I_{DSS}	T-072		×	×	×	×
Gate-source cut off voltage	V_{GSoff}	T-074		×	×	×	×
Gate-source breakdown voltage or	$V_{(BR)GS}$	IEC 60747-4 Amendment 1		×		×	
gate cut-off current with drain short-circuited to source	I_{GSS}	T-071			×		×
Sub-group A4		IEC 60747-4 Amendment 1	See clause 5				
Output power at 1 dB-gain compression or	$P_{o(1dB)}$			×			
output power	P_o			×			
Power gain at 1 dB-gain compression	$G_{P(1dB)}$			×			
Power-added efficiency	η_{add}			×			
Noise figure	F						×
Associated gain	G_{as}					×	

GROUP B

Lot-by-lot tests

(In the case of category I, see 2.6 of the generic specification.)

LSL = lower specification limit
USL = upper specification limit
} group A

Only tests marked (D) are destructive (3.6.6)

Inspection or test	Letter symbols	Reference	Conditions at T_{amb} or T_{case} = 25 °C unless otherwise specified (see clause 4 of the generic specification)	Inspection requirement limit			
				Type A		Type B	
				Min.	Max.	Min.	Max.
Sub-group B1 Dimensions		IEC 60747-10, 4.2.2, appendix B		See clause 1 of this standard			
Sub-group B3 Robustness of terminations Where applicable: Bending (D)		IEC 60749, 2, 1.2	Force = [see IEC 60749, 2, 1.2]	No damage			
Sub-group B4 Solderability		IEC 60749, 2, 2.1	[Solder bath preferred]	Good wetting			
Sub-group B5 Rapid change of temperature: a) Cavity packages Rapid change of temperature followed by:		IEC 60749, 3, 1.1	10 cycles				
– Electrical tests – Gate-source breakdown voltage or gate cut-off current, with drain short-circuited to source	$V_{(BR)GS}$		As in A2	LSL		LSL	
	I_{GSS}		As in A2		USL		USL
– Gate-source cut-off voltage	V_{GSoff}		As in A2	LSL	USL	LSL	USL
– Sealing, fine leak detection		IEC 60749, 3, 5.2 or 5.3	To be specified				
and – Sealing, gross leak detection		IEC 60749, 3, 5.4	To be specified				

GROUP B *(continued)*

Inspection or test	Letter symbols	Reference	Conditions at T_{amb} or T_{case} = 25 °C unless otherwise specified (see clause 4 of the generic specification)	Inspection requirement limit			
				Type A		Type B	
				Min.	Max.	Min.	Max.
Sub-group B5 (cont.)							
b) Non-cavity and epoxy-sealed cavity packages							
Rapid change of temperature followed by:		IEC 60749, 3, 1.1	10 cycles				
– External visual examination		IEC 60747-10 4.2.1.1					
– Damp heat, steady state		IEC 60749, 3, 4C	Severity 3 24 h				
– Electrical tests		See a)	As in a)				
Sub-group B8		See annex A of this standard	High-temperature reverse bias or operating life				
Electrical endurance (168 h)							
followed by:							
– Electrical tests – Gate-source breakdown voltage or gate cut-off current, with drain short-circuited to source	$V_{(BR)GS}$ I_{GSS}		As in A2 As in A2	0,8 LSL	 10 USL	0,8 LSL	 10 USL
– Gate-source cut-off voltage	V_{GSoff}		As in A2	0,8 LSL	1,2 USL	0,8 LSL	1,2 USL
– Drain current with gate short-circuited to source	I_{DSS}		As in A2	0,9 LSL	1,1 USL	0,9 LSL	1,1 USL
Sub-group CRRL	Attributes information for B3, B4, B5 and B8.						

GROUP C

Periodic tests

(In the case of category I, see 2.6 of the generic specification.)

LSL = lower specification limit
USL = upper specification limit
} group A

Only tests marked (D) are destructive (3.6.6)

Inspection or test	Letter symbols	Reference	Conditions at T_{amb} or T_{case} = 25 °C unless otherwise specified (see clause 4 of the generic specification)	Inspection requirement limit			
				Type A		Type B	
				Min.	Max.	Min.	Max.
Sub-group C1 Dimensions		IEC 60747-10 4.2.2, appendix B		[See clause 1 of this standard]			
Sub-group C2a			See clause 5				
– Maximum frequency of oscillation	f_{max}	IEC 60747-4 Amendment 1				×	
– Maximum available gain	$G_{a(max)}$					×	
– Amplitudes and angles of S-parameter, where appropriate	s_{11amp}	T-044		×	×	×	×
	s_{11ang}			×	×	×	×
	s_{12amp}			×	×	×	×
	s_{12ang}			×	×	×	×
	s_{21amp}			×	×	×	×
	s_{21ang}			×	×	×	×
	s_{22amp}			×	×	×	×
	s_{22ang}			×	×	×	×
Sub-group C2b Gate cut-off current with drain short-circuited to source	I_{GSS}	T-071	T =[specified high temperature] V_{GS} = [preferably between 65 % and 85 % of V_{GSR} max.]		×		×
Sub-group C2d Thermal resistance channel to case	$R_{th(j-c)}$		[As specified]		×		
Sub-group C3 Robustness of terminations where applicable: – Tensile and/or – Torque (D)		IEC 60749, 2, 1.1 IEC 60749, 2, 1.4		>> No damage			

GROUP C *(continued)*

Inspection or test	Letter symbols	Reference	Conditions at T_{amb} or T_{case} = 25 °C unless otherwise specified (see clause 4 of the generic specification)	Inspection requirement limit			
				Type A		Type B	
				Min.	Max.	Min.	Max.
Sub-group C4			Periodicity = 6 months				
Resistance to soldering heat (D) followed by:		IEC 60749, 2, 2.2					
– Electrical tests							
– Gate-source breakdown voltage or	$V_{(BR)GS}$		As in A2	LSL		LSL	
– Gate cut-off current, with drain short-circuited to source	I_{GSS}		As in A2		USL		USL
– Gate-source cut-off voltage	V_{GSoff}		As in A2	LSL	USL	LSL	USL
Sub-group C5							
Rapid change of temperature: (see note)							
a) Cavity packages							
Rapid change of temperature followed by:		IEC 60749, 3, 1.1	10 cycles				
– Electrical tests							
– Gate-source breakdown voltage or gate cut-off drain short-circuited to source current, with	$V_{(BR)GS}$		As in A2	LSL		LSL	
	I_{GSS}		As in A2		USL		USL
– Gate-source cut-off voltage	V_{GSoff}		As in A2	LSL	USL	LSL	USL
– Sealing, fine leak detection		IEC 60749, 3, 5.2 or 5.3	To be specified				
and							
– Sealing, gross leak detection		IEC 60749, 3, 5.4	To be specified				
NOTE After three successful consecutive tests, the periodicity may be reduced to once per year.							

GROUP C *(continued)*

Inspection or test	Letter symbols	Reference	Conditions at T_{amb} or T_{case} = 25 °C unless otherwise specified (see clause 4 of the generic specification)	Inspection requirement limit			
				Type A		Type B	
				Min.	Max.	Min.	Max.
Sub-group C5 (cont.) b) Non-cavity and epoxy-sealed cavity packages Rapid change of temperature followed by: – External visual examination – Damp heat, steady state – Electrical tests		IEC 60749, 3, 1.1 IEC 60747-10, 4.2.1.1 IEC 60749, 3, 4C See a)	500 cycles Severity 3 24 h As in a)				
Sub-group C6 – Acceleration, steady state for cavity packages followed by: – Electrical tests		IEC 60749, 2, 5 See subgroup C4	As in C4				
Sub-group C7 – Damp heat, steady state – for cavity packages (see note) – for non-cavity and epoxy-sealed cavity packages followed by (for both types): – Electrical tests		IEC 60749, 3, 4A IEC 60749, 3, 4B See subgroup C4	Severity: 56 days for categories II and III, 21 days for category I Severity 1 Bias: as specified in the detail specification Duration: 1 000 h for categories II and III, 500 h for category I As in C4				
NOTE After three successful consecutive tests, the periodicity may be reduced to once per year.							

GROUP C *(continued)*

Inspection or test	Letter symbols	Reference	Conditions at T_{amb} or T_{case} = 25 °C unless otherwise specified (see clause 4 of the generic specification)	Inspection requirement limit			
				Type A		Type B	
				Min.	Max.	Min.	Max.
Sub-group C8							
Electrical endurance (1 000 h)		See IEC 60747-8-1, Appendix I	[High-temperature reverse bias or operating life]				
followed by:							
– Electrical tests							
– Gate-source breakdown voltage or	$V_{(BR)GS}$		As in A2	0,8 LSL		0,8 LSL	
gate cut-off current, with drain short-circuited to source	I_{GSS}		As in A2		10 USL		10 USL
– Gate-source cut-off voltage	V_{GSoff}		As in A2	0,8 LSL	1,2 USL	0,8 LSL	1,2 USL
– Drain current with gate short-circuited to source	I_{DSS}		As in A2	0,9 LSL	1,1 USL	0,9 LSL	1,1 USL
Sub-group C9							
Storage at high temperature (D) followed by:		IEC 60749, 3, 2	1 000 h min. at [T_{stg} max.]				
– Electrical tests		See subgroup C8	As in C8				
Sub-group CRRL	Attributes information for C3, C6, and C9. Measurement information before and after C8.						

9 Group D – Qualification approval tests

[When required, these tests shall be prescribed in the detail specification for qualification approval only.]

10 Additional information (not for inspection purposes)

[To be given only as far as necessary for the specification and use of the device, for instance:

– temperature derating curves referred to in the limiting values;
– complete definition of a circuit for measurement, or of an additional method;
– detailed outline drawing;
– details about handling precautions or labelling of electrostatic-sensitive devices, where appropriate.]

Annex A
(normative)

Field-effect transistors

A.1 Operating life shall be performed at T_{amb} or T_{case} = test temperature T_{test} chosen between that of the break point, T_{br} and the temperature which corresponds to the 20 % dissipation point on the derating curve (but preferably near T_{br}) with

$I_D \times V_{DS} = P_{tot}$ max. (at specified T_{test})

$I_D < I_{DSS}$ min. specified in characteristics (for types A and B)

Circuit conditions should be chosen to satisfy the following:

V_{GG} = set to obtain the required I_D (devices having close values of I_{DSS} may be grouped)

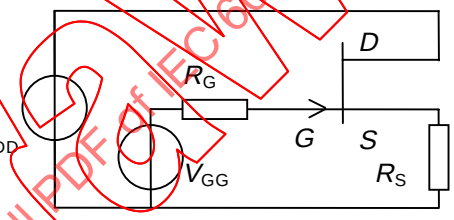
R_G = 10 kΩ or as specified.

Preferably, for best regulation:

$R_S = V_{DS} / I_D$

V_{DS} = specified (preferably 0,8 V_{DS} max.)

$V_{DD} = 2\ V_{DS}$



IEC 581/2000

In order not to exceed V_{DSX}, a clamping circuit may be used in parallel with the device.

A.2 High-temperature reverse bias shall be performed under the following conditions, either for depletion or enhancement types:

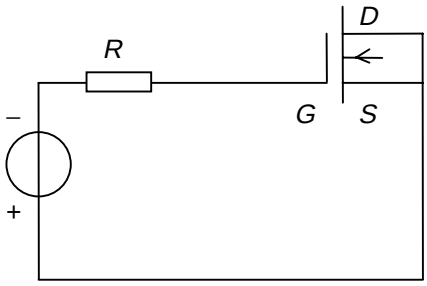
Depletion types:

V_{DS} = 0

V_{GS} = 0,7 to 0,8 V_{GSO} max. (preferably 0,8)

$T = T_{amb}$ max. or T_{case} max.

R = current-limiting resistor



IEC 582/2000

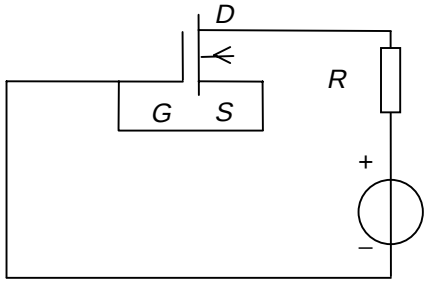
Enhancement types:

V_{GS} = 0

V_{DS} = 0,7 to 0,8 V_{DSS} max. (preferably 0,8)

$T = T_{amb}$ max. or T_{case} max.

R = current-limiting resistor



IEC 583/2000