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AMENDMENT 1

Semiconductor devices – Discrete devices – Part 8: Field-effect transistors

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SEMICONDUCTOR DEVICES –
DISCRETE DEVICES –

Part 8: Field-effect transistors

AMENDMENT 1

FOREWORD

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Amendment 1 to IEC 60747-8:2021 has been prepared by subcommittee 47E: Discrete semiconductor devices, of IEC technical committee 47: Semiconductor devices.

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

Draft	Report on voting
47E/726/CDV	47E/744/RVC

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

The language used for the development of this Amendment is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications/.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- withdrawn,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

3.4 Conventional used terms

Replace the existing Table 1 title and whole table in this subclause with the following new Table 1:

Table 1 – Terms for MOSFET in this document and the conventional used terms for the inverse diode integrated in the MOSFETs for N-channel

Preferred terms	Letter symbol	Deprecated terms for inverse diode with MOSFET in off-state
Drain-source reverse voltage	V_{SD}	Inverse diode forward voltage
MOSFET forward recovery current	I_{fr}	Inverse diode reverse recovery current
MOSFET peak forward recovery current	I_{frm}	Inverse diode peak reverse recovery current
MOSFET forward recovery time	t_{fr}	Inverse diode reverse recovery time
MOSFET forward recovery charge	Q_f	Inverse diode reverse recovery charge
MOSFET forward recovery energy	E_{fr}	Inverse diode reverse recovery energy
Reverse drain current	I_S	Inverse diode forward current
Repetitive peak reverse drain current	I_{SRM}	Inverse diode repetitive peak forward current

4.3.2 Currents

Delete, in this subclause, the existing third item I_{DRM}.

Replace, in 4.3.2, the existing seventh item with the following new item:

Source (d.c.) current (for P-channel)	I_S	

Add, after the new item " Source (d.c.) current (for P-channel) I_S*", the following new item:*

Peak source current (for P-channel)	I_{SM}	

Replace, in this subclause, the existing eighth item with the following new item:

Source current, at a specified gate-drain condition (for P-channel)	I_{SDX}	

Replace, in this subclause, the existing ninth item with the following new item:

Source current, with gate short-circuited to drain (V_{GD} = 0) (for P-channel)	I_{SDS}	

Delete, in this subclause, the existing tenth item I_G.

4.3.7 Inverse diodes integrated in MOSFETs

Replace the existing title of 4.3.7 with the following new title.

Replace, in 4.3.7, the existing first, second, third and seventh items with the following new items:

4.3.7 Inverse diodes integrated in MOSFETs for N-channel		
Drain-source reverse voltage	V_{SD}	Forward voltage of the inverse diode
MOSFET forward recovery current	I_{fr}	Reverse recovery current of the inverse diode
MOSFET peak forward recovery current	I_{frm}	Peak reverse recovery current of the inverse diode
Reverse drain current	I_S	Forward current of the inverse diode

Add, in 4.3.7, the following new item:

Repetitive peak reverse drain current	I_{SRM}	Repetitive peak forward current of the inverse diode

5.2.4.8 Maximum continuous (d.c.) reverse drain current (I_{DR}) (forward current of the inverse diode)

5.2.4.9 Maximum peak reverse drain current (I_{DRM}) (Maximum peak forward current of the inverse diode)

Replace the existing Subclauses 5.2.4.8 and 5.2.4.9 with the following new subclauses:

	TYPES		
	A	B	C
5.2.4.8 Maximum continuous (d.c.) reverse drain current (I_S) (forward current of the inverse diode)		+	+
5.2.4.9 Maximum peak reverse drain current (I_{SM}) (Maximum peak forward current of the inverse diode) Under specified pulse conditions.		+	+

5.3.3.10.1 Drain-source reverse voltage (V_{DSR}) (Forward voltage of the inverse diode)

5.3.3.10.3 Peak forward recovery current (I_{FRM}) (Peak reverse recovery current of the inverse diode)

Replace the existing Subclauses 5.3.3.10.1 and 5.3.3.10.3 with the following new subclauses:

	TYPES		
	A	B	C
5.3.3.10.1 Drain-source reverse voltage (V_{SD}) (Forward voltage of the inverse diode) Maximum value at specified reverse drain current (I_S) (forward current of the inverse diode) and at V_{GS} = 0.		+	+
5.3.3.10.3 Peak forward recovery current (I_{frm}) (Peak reverse recovery current of the inverse diode) Maximum value under specified conditions.		+	+

5.3.4.9.1 Reverse drain current (I_{DR}) (forward current of the inverse diode)

Replace the existing Subclause 5.3.4.9.1 with the following new subclause:

	TYPES		
	A	B	C
5.3.4.9.1 Reverse drain current (I_S) (forward current of the inverse diode) Maximum value at specified Reverse drain current (I_S) and at V_{GS} = 0.		+	+

6.2.1.6 Reverse drain current (I_{DRS}) or (I_{DRX})

Replace the existing title of 6.2.1.6 with the following new title:

6.2.1.6 Reverse drain current (I_{SS}) or (I_{SX})

Replace, in the paragraph "Specified conditions", the existing fourth bullet with the following new condition:

- Reverse drain current I_S

6.2.1.7 Peak reverse drain current (I_{DRM})

Replace the existing title of 6.2.1.7 with the following new title:

6.2.1.7 Peak reverse drain current (I_{SM})

Replace the existing Figure 10 with the following new Figure 10:

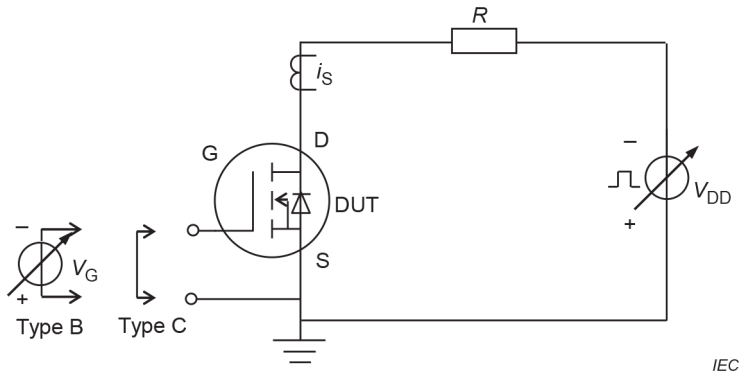

Figure 10 – Basic circuit for the testing of peak reverse drain current of MOSFETs

Replace, under "Specified conditions"*, the existing fourth bullet with the following new bulleted point:*

- Peak reverse drain current I_{SM}

6.2.2.2 Reverse-bias safe operation area (RBSOA)

Replace, in 6.2.2.2, the first paragraph of the existing testing procedure with the following:

DUT is turned off at specified I_D and V_{DS}. I_D and V_{DS} are monitored. The DUT has to turn off I_D and withstand $V_{DS} = V_{DS(clamp)}$.

Figure 34 – Current waveform through MOSFET (Method 1)

Replace the existing Figure 34 with the following new Figure 34:

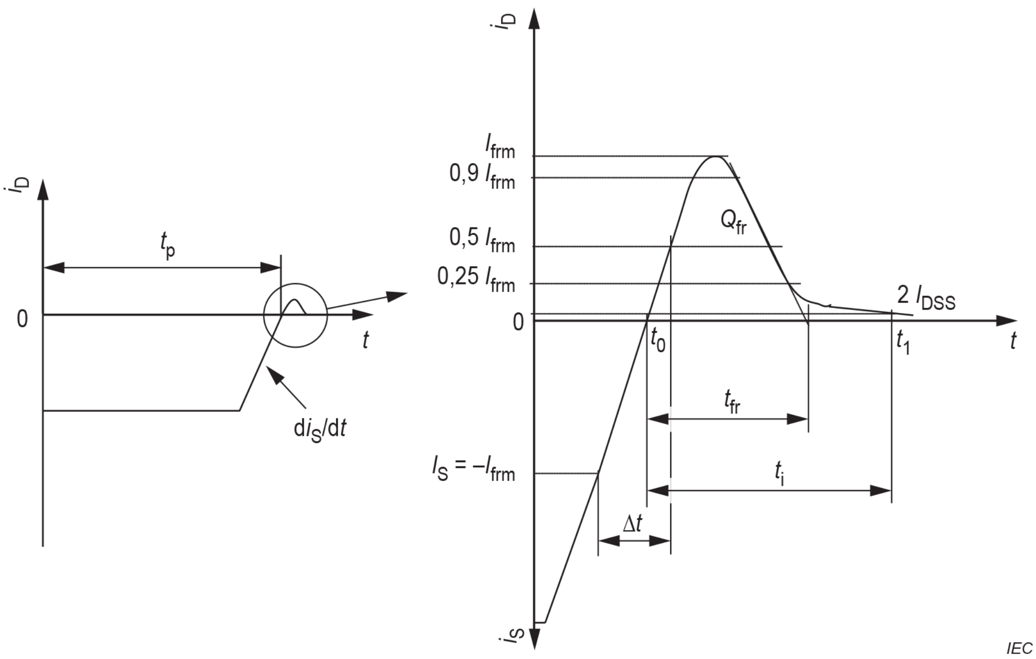

Figure 34 – Current waveform through MOSFET (Method 1)

6.3.14 MOSFET forward recovery time (t_{fr}) and MOSFET forward recovered charge (Q_f)

Replace, in 6.3.14, Method 1, under "Circuit description and requirements"*,* "MOSFET T" *with* " MOSFET *T*" *and the letter symbol* "di_{DR}/dt" *with* "di_S/dt"*.*

Replace, in 6.3.14, Method 1, the existing text under "Measurement procedure" *with the following new sentences:*

MOSFET *T* is turned on and turned off twice, and then the second turn-on is observed. Waveforms of the current I_S are monitored. The recovered charge is measured as

$$Q_f = \int_{t_0}^{t_0 + t_i} i_S \cdot dt$$

where

t_0 is the instant when the current passes through zero;

t_i is the integration time.

Integral end time t_1 is the time when forward drain current reaches 2 × I_{DSS}, preferably equal to the specified maximum value of t_{fr}. Δt can be adjusted by MOSFET *T* driving conditions, such as V_G and/or *R*. The forward recovery time t_{fr} is measured as the interval between the time of t_0 when the drain current passes through zero and the time when, for decreasing values of I_D, a line through the points for 0,9 I_{frm} and 0,25 I_{frm} crosses the zero current axis.

Replace, in Subclause 6.3.14, Method 1, the existing second and third bullets under "Specified conditions" *with the following new bulleted points:*

- Peak reverse drain current I_{SM}