

IPTC014N10NM5ATMA1 Datasheet

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DiGi Electronics Part Number	IPTC014N10NM5ATMA1-DG
Manufacturer	Infineon Technologies
Manufacturer Product Number	IPTC014N10NM5ATMA1
Description	OPTIMOS 5 POWER MOSFET
Detailed Description	N-Channel 100 V 37A (Ta), 365A (Tc) 3.8W (Ta), 375 W (Tc) Surface Mount PG-HDSOP-16-2

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Manufacturer Product Number:

IPTC014N10NM5ATMA1

Series:

OptiMOS™ 5

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

100 V

Drive Voltage (Max Rds On, Min Rds On):

6V, 10V

Vgs(th) (Max) @ Id:

3.8V @ 280µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 175°C (Tj)

Supplier Device Package:

PG-HDSOP-16-2

Manufacturer:

Infineon Technologies

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

37A (Ta), 365A (Tc)

Rds On (Max) @ Id, Vgs:

1.4mOhm @ 150A, 10V

Gate Charge (Qg) (Max) @ Vgs:

211 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

16000 pF @ 50 V

Power Dissipation (Max):

3.8W (Ta), 375W (Tc)

Mounting Type:

Surface Mount

Package / Case:

16-PowerSOP Module

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

MOSFET

OptiMOS™ 5 Power-Transistor, 100 V

Features

- N-channel
- Very low on-resistance $R_{DS(on)}$
- Superior thermal resistance
- 100% avalanche tested
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

Product validation

Fully qualified according to JEDEC for Industrial Applications

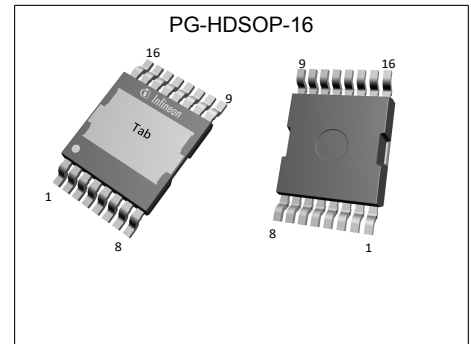
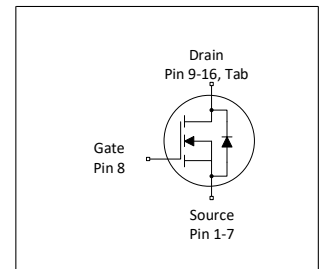


Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(on),max}$	1.4	$m\Omega$
I_D	365	A
Q_{oss}	213	nC
Q_G	168	nC



RoHS

Type / Ordering Code	Package	Marking	Related Links
IPTC014N10NM5	PG-HDSOP-16	14N10NM5	-



OptiMOS™ 5 Power-Transistor, 100 V

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OptiMOS™ 5 Power-Transistor, 100 V

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1 Maximum ratings

at $T_A=25\text{ °C}$, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D	-	-	365 258 216 37	A	$V_{GS}=10\text{ V}$, $T_C=25\text{ °C}$ $V_{GS}=10\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=6\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=10\text{ V}$, $T_A=25\text{ °C}$, $R_{thJA}=40\text{ °C/W}^2)$
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	1460	A	$T_A=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	775	mJ	$I_D=150\text{ A}$, $R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	375 3.8	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}$, $R_{thJA}=40\text{ °C/W}^2)$
Operating and storage temperature	T_j , T_{stg}	-55	-	175	°C	IEC climatic category; DIN IEC 68-1: 55/175/56

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	0.2	0.4	°C/W	-
Thermal resistance, junction - ambient, 6 cm ² cooling area ²⁾	R_{thJA}	-	-	40	°C/W	-
Thermal resistance, junction - ambient, minimal footprint	R_{thJA}	-	-	62	°C/W	-

¹⁾ Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature as specified. For other case temperatures please refer to Diagram 2. De-rating will be required based on the actual environmental conditions.

²⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

³⁾ See Diagram 3 for more detailed information

⁴⁾ See Diagram 13 for more detailed information

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3 Electrical characteristics

at $T_j=25\text{ °C}$, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2.2	3.0	3.8	V	$V_{DS}=V_{GS}$, $I_D=280\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1 10	5.0 100	μA	$V_{DS}=100\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=100\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	1.3 1.6	1.4 2.0	m Ω	$V_{GS}=10\text{ V}$, $I_D=150\text{ A}$ $V_{GS}=6\text{ V}$, $I_D=75\text{ A}$
Gate resistance ¹⁾	R_G	-	1.4	2.1	Ω	-
Transconductance	g_{fs}	140	280	-	S	$ V_{DS} \geq 2 I_D R_{DS(on)max}$, $I_D=100\text{ A}$

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance ¹⁾	C_{iss}	-	12000	16000	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Output capacitance ¹⁾	C_{oss}	-	1800	2300	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance ¹⁾	C_{rss}	-	80	140	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	36	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Rise time	t_r	-	30	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	85	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Fall time	t_f	-	30	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=100\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$

Table 6 Gate charge characteristics²⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	53	-	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	36	-	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge ¹⁾	Q_{gd}	-	34	51	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	51	-	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total ¹⁾	Q_g	-	168	211	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	4.4	-	V	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge ¹⁾	Q_{oss}	-	213	285	nC	$V_{DS}=50\text{ V}$, $V_{GS}=0\text{ V}$

¹⁾ Defined by design. Not subject to production test.

²⁾ See "Gate charge waveforms" for parameter definition



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Table 7 Reverse diode

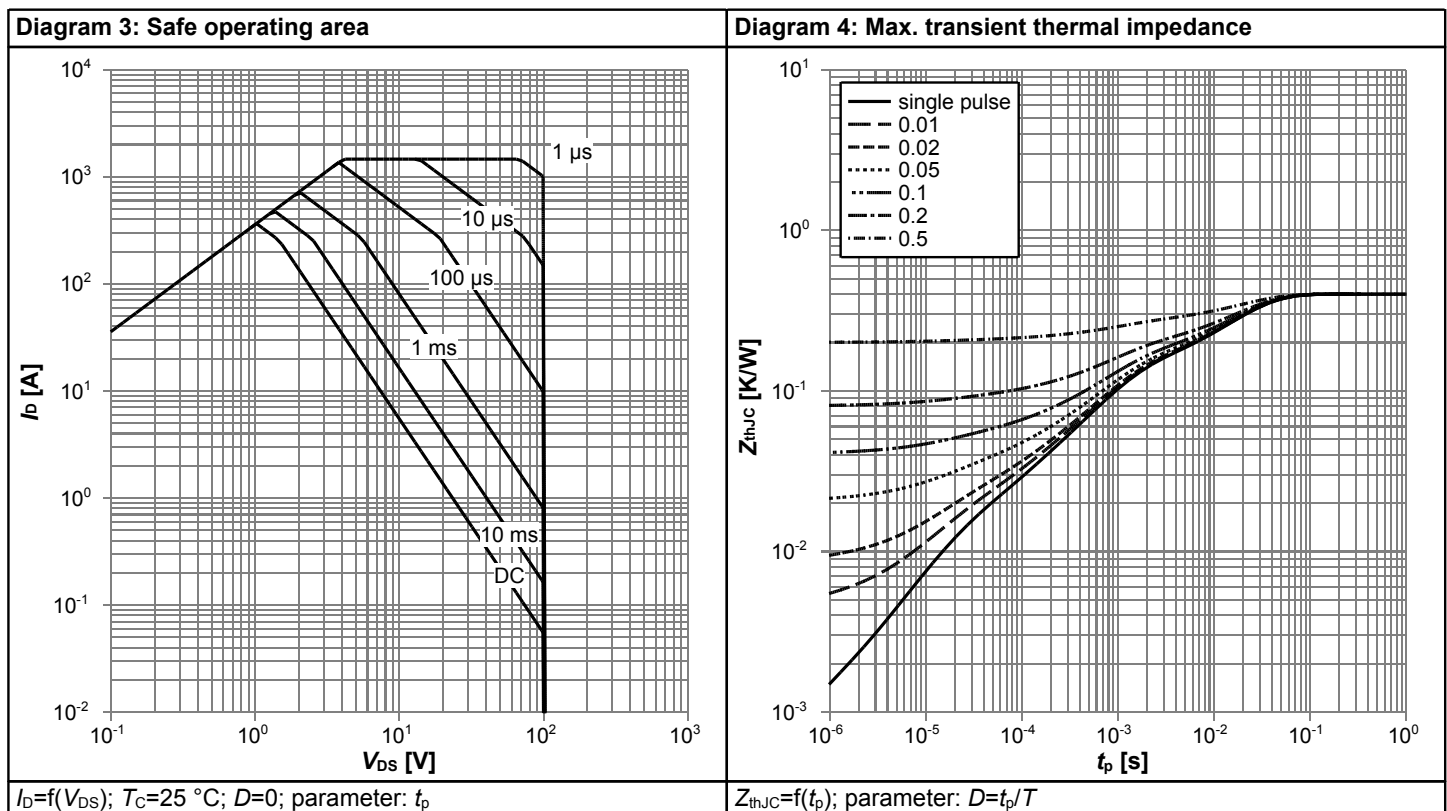
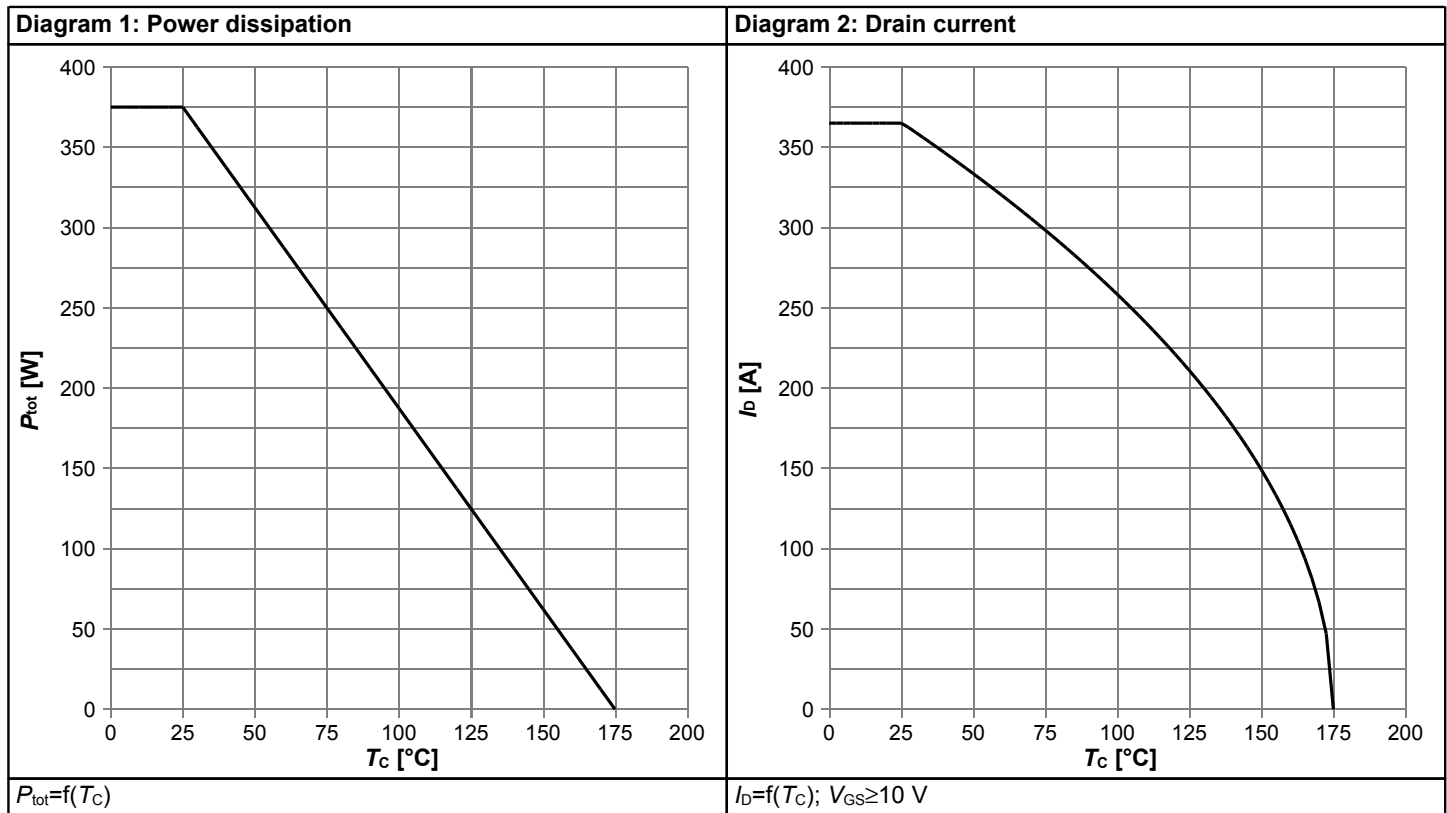
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	320	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	1460	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	0.88	1.0	V	$V_{GS}=0\text{ V}, I_F=150\text{ A}, T_j=25\text{ °C}$
Reverse recovery time ¹⁾	t_{rr}	-	103	206	ns	$V_R=50\text{ V}, I_F=100\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁾	Q_{rr}	-	316	632	nC	$V_R=50\text{ V}, I_F=100\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$

¹⁾ Defined by design. Not subject to production test.

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4 Electrical characteristics diagrams



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Diagram 5: Typ. output characteristics

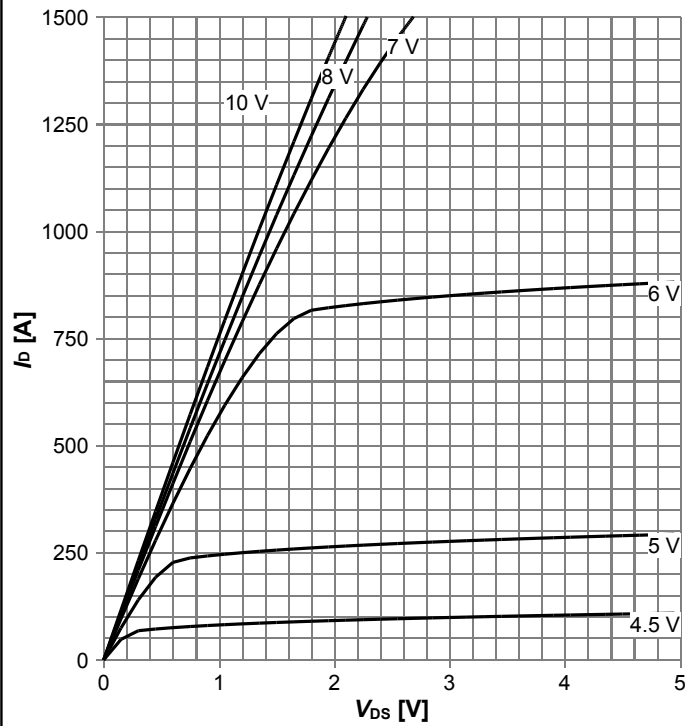

 $I_D = f(V_{DS})$, $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance

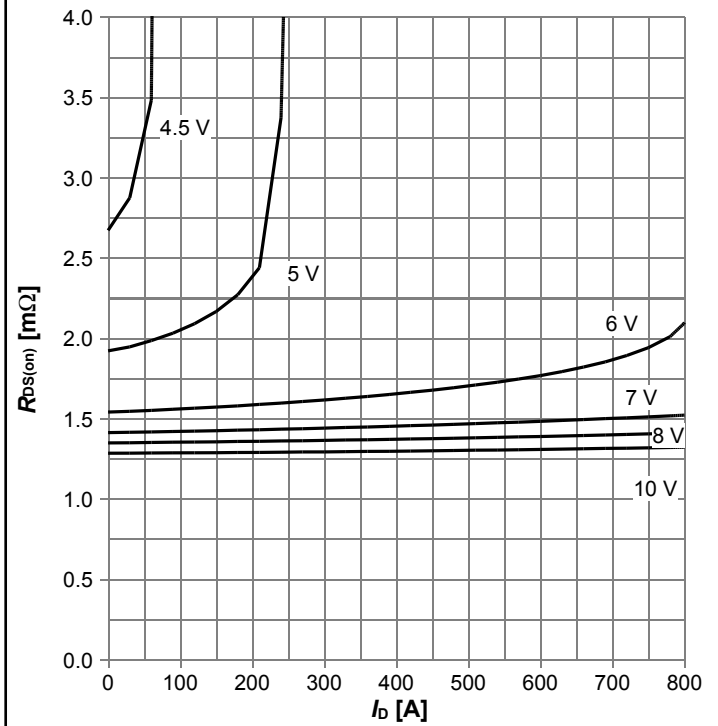

 $R_{DS(on)} = f(I_D)$, $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics

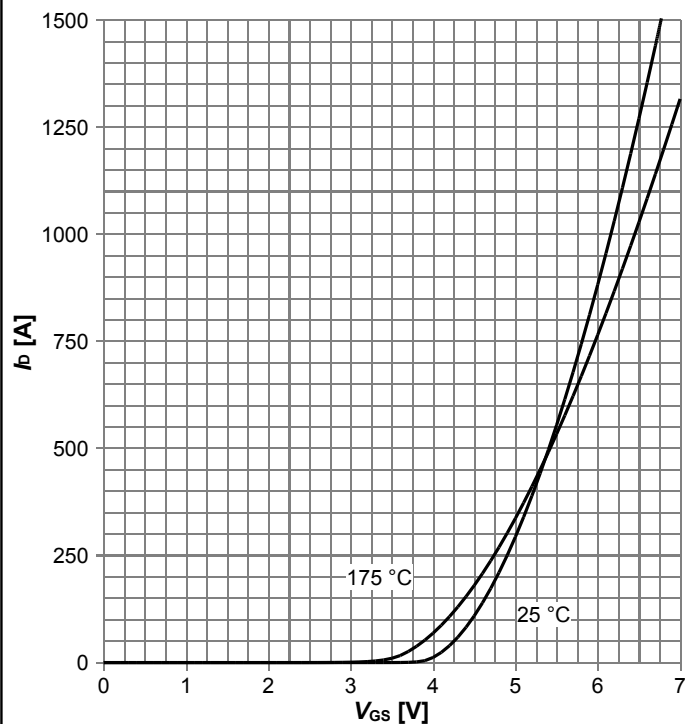
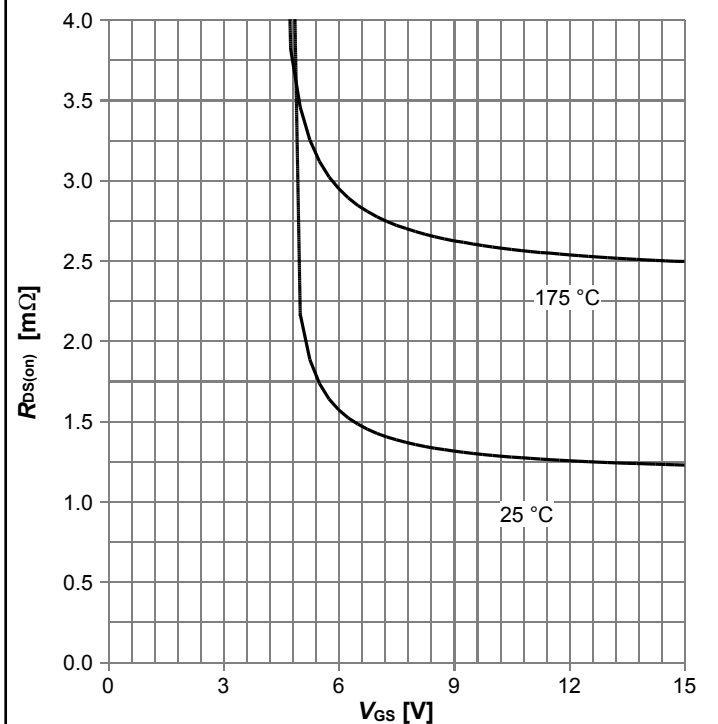

 $I_D = f(V_{GS})$, $|V_{DS}| > 2|I_D|R_{DS(on)max}$; parameter: T_j

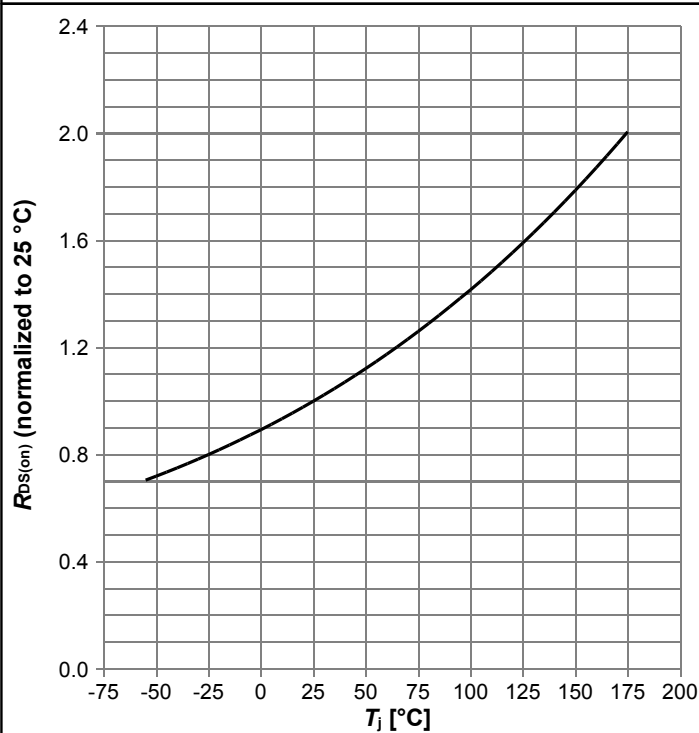
Diagram 8: Typ. drain-source on resistance


 $R_{DS(on)} = f(V_{GS})$, $I_D = 150\text{ A}$; parameter: T_j



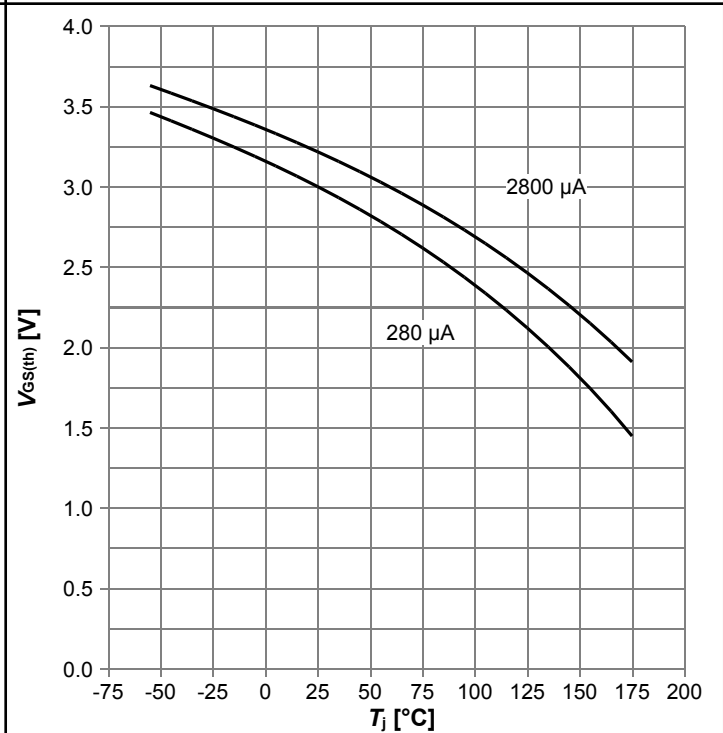
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Diagram 9: Normalized drain-source on resistance



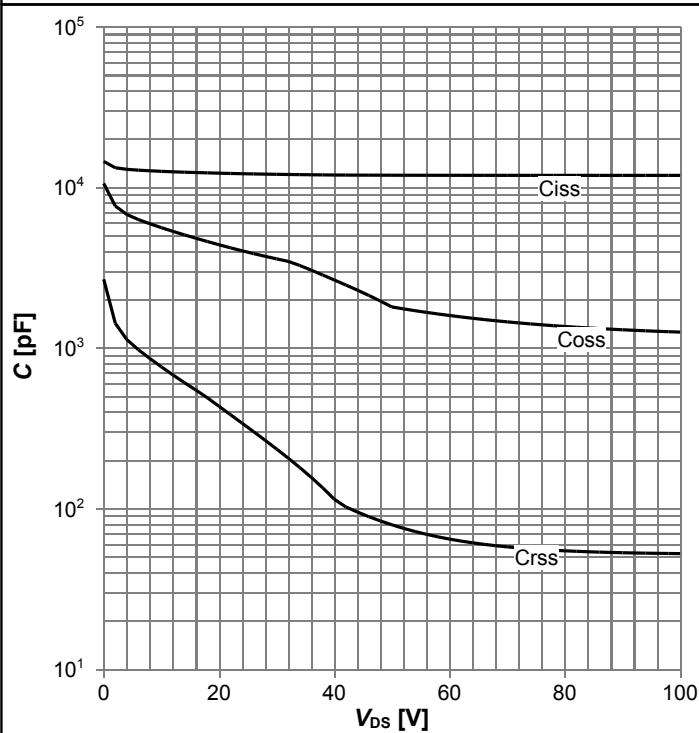
$R_{DS(on)}=f(T_j)$, $I_D=150\text{ A}$, $V_{GS}=10\text{ V}$

Diagram 10: Typ. gate threshold voltage



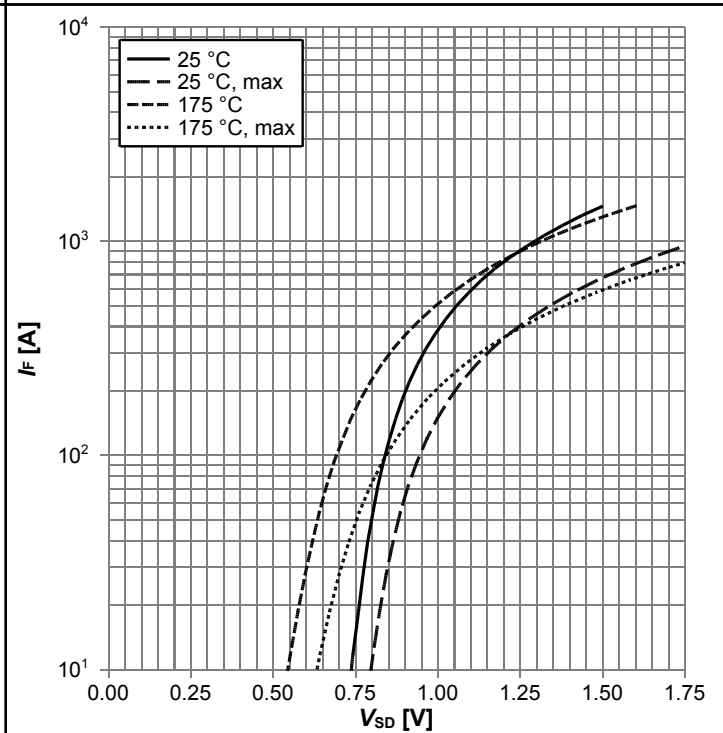
$V_{GS(th)}=f(T_j)$, $V_{GS}=V_{DS}$; parameter: I_D

Diagram 11: Typ. capacitances



$C=f(V_{DS})$; $V_{GS}=0\text{ V}$; $f=1\text{ MHz}$

Diagram 12: Forward characteristics of reverse diode

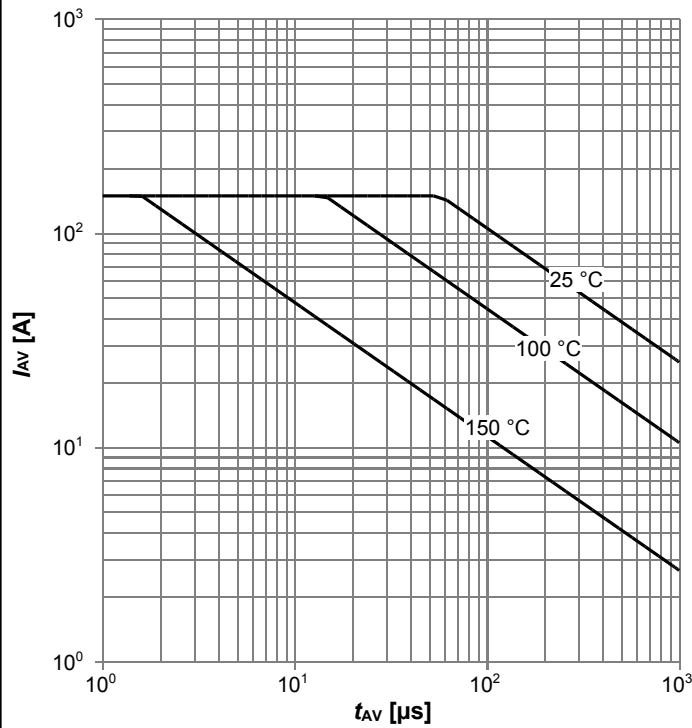


$I_F=f(V_{SD})$; parameter: T_j



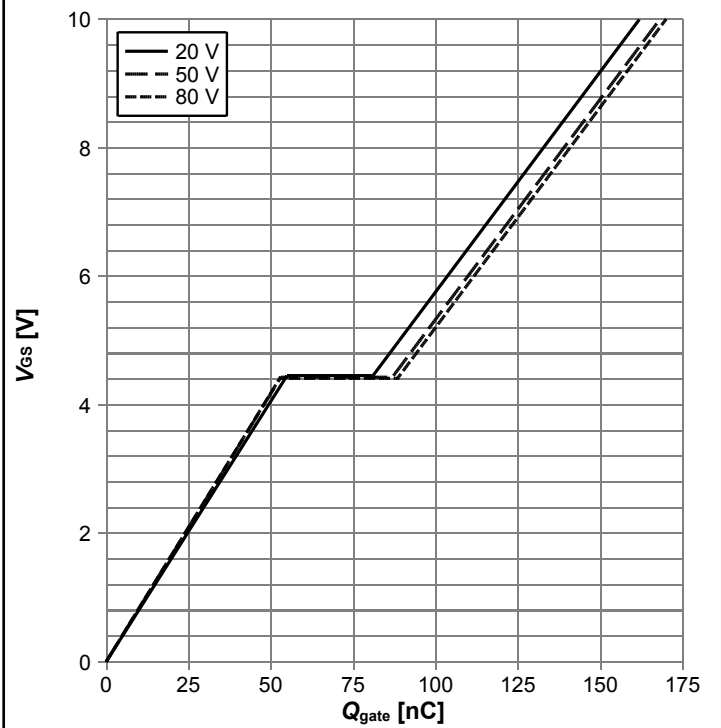
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Diagram 13: Avalanche characteristics



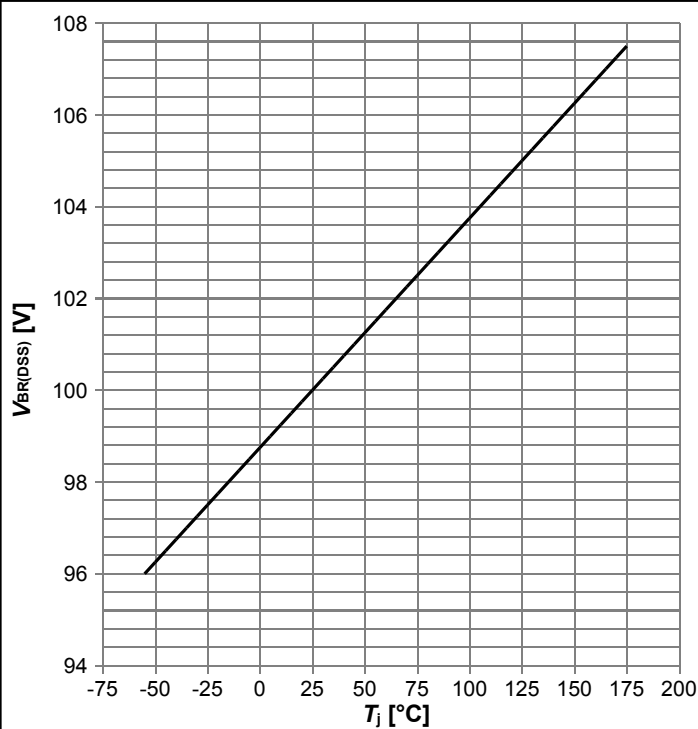
$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



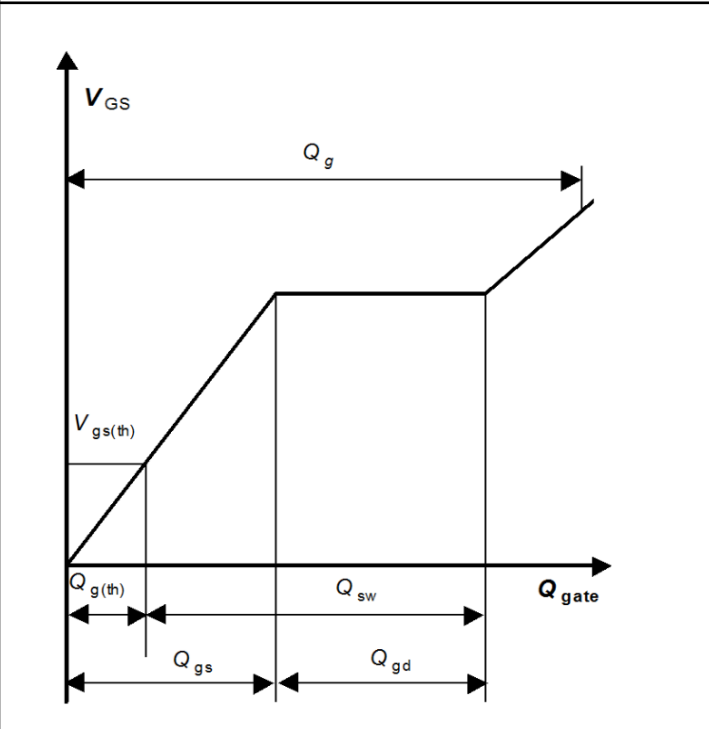
$V_{GS}=f(Q_{gate}), I_D=100$ A pulsed, $T_j=25$ °C; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage



$V_{BR(DSS)}=f(T_j); I_D=1$ mA

Diagram Gate charge waveforms



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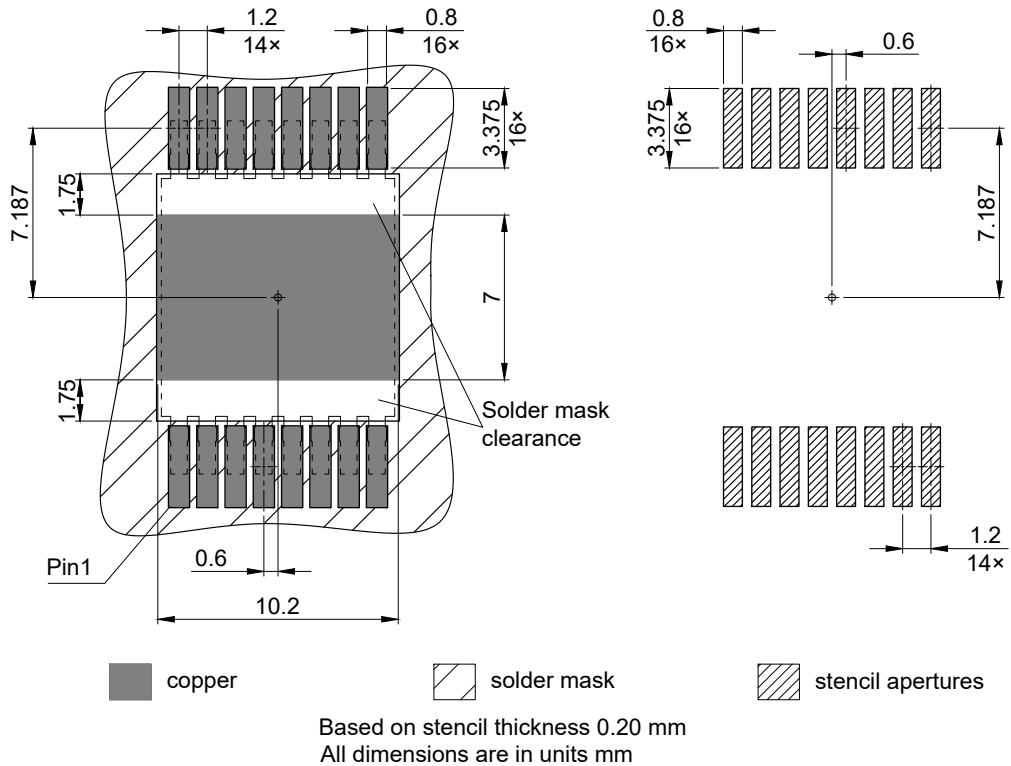
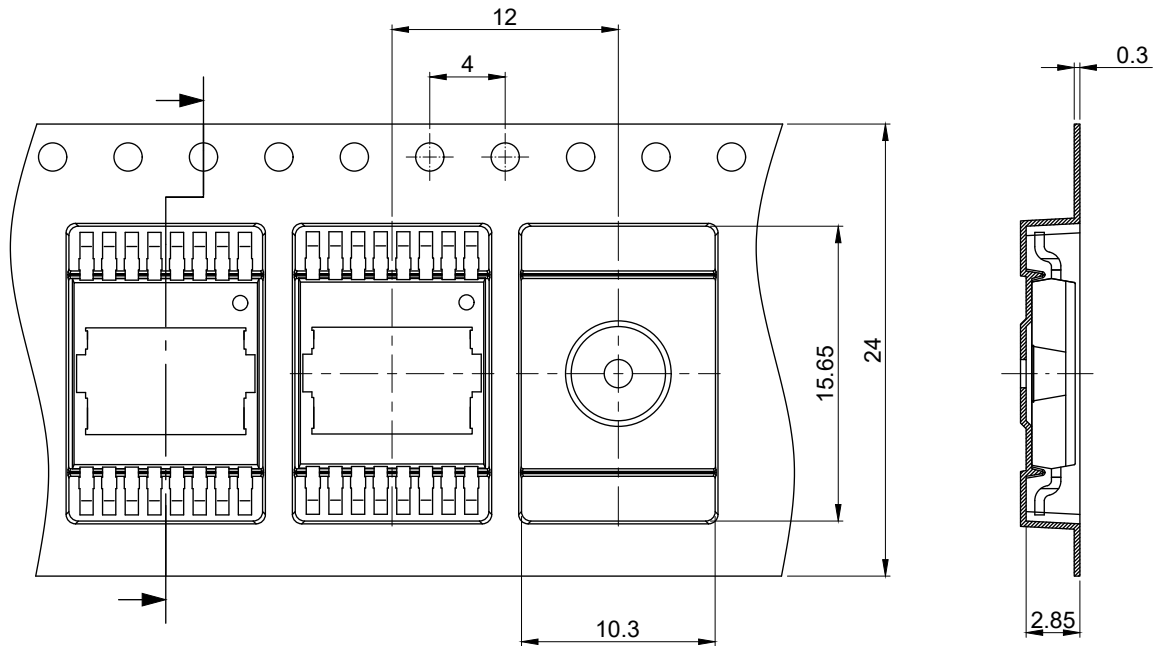


Figure 2 Outline Footprint (PG-HDSOP-16), dimensions in mm

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All dimensions are in units mm


The drawing is in compliance with ISO 128-30, Projection Method 1 []

Figure 3 Outline Tape (PG-HDSOP-16), dimensions in mm



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Revision History

IPTC014N10NM5

Revision: 2022-05-24, Rev. 2.0

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2022-05-24	Release of final version

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