

MOSFET

OptiMOS™ 7 Power-Transistor, 40 V

Features

- N-channel, logic level
- 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

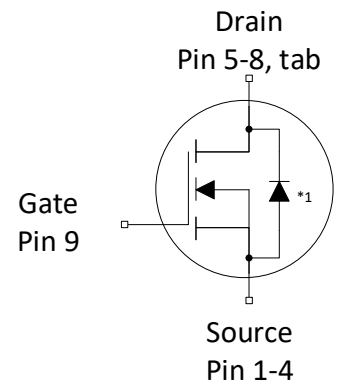
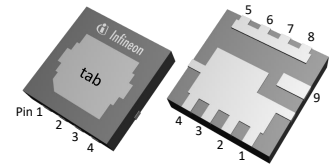
Product validation

Qualified according to relevant JEDEC tests.

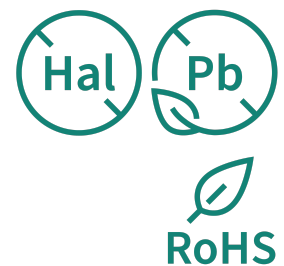
Table 1 Key performance parameters

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(on),max}$	1.0	mΩ
I_D	270	A
Q_{oss}	43	nC
$Q_G (0V...4.5V)$	18.9	nC

PG-WHTFN-9 (3x3)



*1: Internal body diode



Part number	Package	Marking	Related links
IQE010N04LM7CGSC	PG-WHTFN-9	A	-



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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	-	-	270	A	$V_{GS}=10\text{ V}, T_C=25\text{ °C}$
				191		$V_{GS}=10\text{ V}, T_C=100\text{ °C}$
				168		$V_{GS}=4.5\text{ V}, T_C=100\text{ °C}$
				35		$V_{GS}=10\text{ V}, T_A=25\text{ °C}, R_{thJA}=60\text{ °C/W}^2)$
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	1080	A	$T_A=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	255	mJ	$I_D=20\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-12	-	12	V	-
Power dissipation	P_{tot}	-	-	150	W	$T_C=25\text{ °C}$
				2.5		$T_A=25\text{ °C}, R_{thJA}=60\text{ °C/W}^2)$
Operating and storage temperature	T_j, T_{stg}	-55	-	175	°C	-

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

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, bottom	R_{thJC}	-	-	1.0	°C/W	-
Thermal resistance, junction - case, top	R_{thJC}			1.4		
Thermal resistance, junction - ambient, 6 cm ² cooling area ⁵⁾	R_{thJA}			60		

⁵⁾ 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 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	$V_{(BR)DSS}$	40	-	-	V	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	1.1	1.4	1.7	V	$V_{DS}=V_{GS}$, $I_D=458\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1	1	μA	$V_{DS}=32\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$
			10	100		$V_{DS}=32\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=12\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.85	1.0	m Ω	$V_{GS}=10\text{ V}$, $I_D=20\text{ A}$
			0.93	1.1		$V_{GS}=6\text{ V}$, $I_D=20\text{ A}$
			1.04	1.3		$V_{GS}=4.5\text{ V}$, $I_D=20\text{ A}$
Gate resistance ⁶⁾	R_G	-	0.8	-	Ω	-
Transconductance ⁶⁾	g_{fs}	66	130	-	S	$ V_{DS} \geq 2 I_D $, $R_{DS(on)max}$, $I_D=20\text{ A}$

⁶⁾ Defined by design. Not subject to production test.

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance ⁷⁾	C_{iss}	-	3000	3900	pF	$V_{GS}=0\text{ V}$, $V_{DS}=20\text{ V}$, $f=1\text{ MHz}$
Output capacitance ⁷⁾	C_{oss}		980	1300		
Reverse transfer capacitance ⁷⁾	C_{rss}		50	88		
Turn-on delay time	$t_{d(on)}$	-	4	-	ns	$V_{DD}=20\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=20\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Rise time	t_r		2			
Turn-off delay time	$t_{d(off)}$		19			
Fall time	t_f		3			

⁷⁾ Defined by design. Not subject to production test.

Table 6 Gate charge characteristics ⁸⁾

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	7.1	-	nC	$V_{DD}=20\text{ V}$, $I_D=20\text{ A}$, $V_{GS}=0$ to 4.5 V
Gate charge at threshold	$Q_{g(th)}$	-	4.2	-	nC	
Gate to drain charge ⁹⁾	Q_{gd}	-	3.9	5.9	nC	
Switching charge	Q_{sw}	-	6.7	-	nC	
Gate charge total ⁹⁾	Q_g	-	18.9	24	nC	
Gate plateau voltage	$V_{plateau}$	-	2.4	-	V	
Gate charge total ⁹⁾	Q_g	-	39	52	nC	$V_{DD}=20\text{ V}$, $I_D=20\text{ A}$, $V_{GS}=0$ to 10 V
Gate charge total, sync. FET	$Q_{g(sync)}$	-	16.6	-	nC	$V_{DS}=0.1\text{ V}$, $V_{GS}=0$ to 10 V
Output charge ⁹⁾	Q_{oss}	-	43	57	nC	$V_{DS}=20\text{ V}$, $V_{GS}=0\text{ V}$

⁸⁾ See "Gate charge waveforms" for parameter definition

⁹⁾ Defined by design. Not subject to production test.

Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	136	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	1080		
Diode forward voltage	V_{SD}	-	0.74	1.0	V	$V_{GS}=0\text{ V}$, $I_F=20\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time ¹⁰⁾	t_{rr}	-	33	65	ns	$V_R=20\text{ V}$, $I_F=20\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}	-	29	58	nC	
Reverse recovery time ¹⁰⁾	t_{rr}	-	23	46	ns	$V_R=20\text{ V}$, $I_F=20\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}	-	87	174	nC	
Reverse recovery time ¹⁰⁾	t_{rr}	-	19	38	ns	$V_R=20\text{ V}$, $I_F=20\text{ A}$, $di_F/dt=1000\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}	-	124	249	nC	

¹⁰⁾ Defined by design. Not subject to production test.

4 Electrical characteristics diagrams

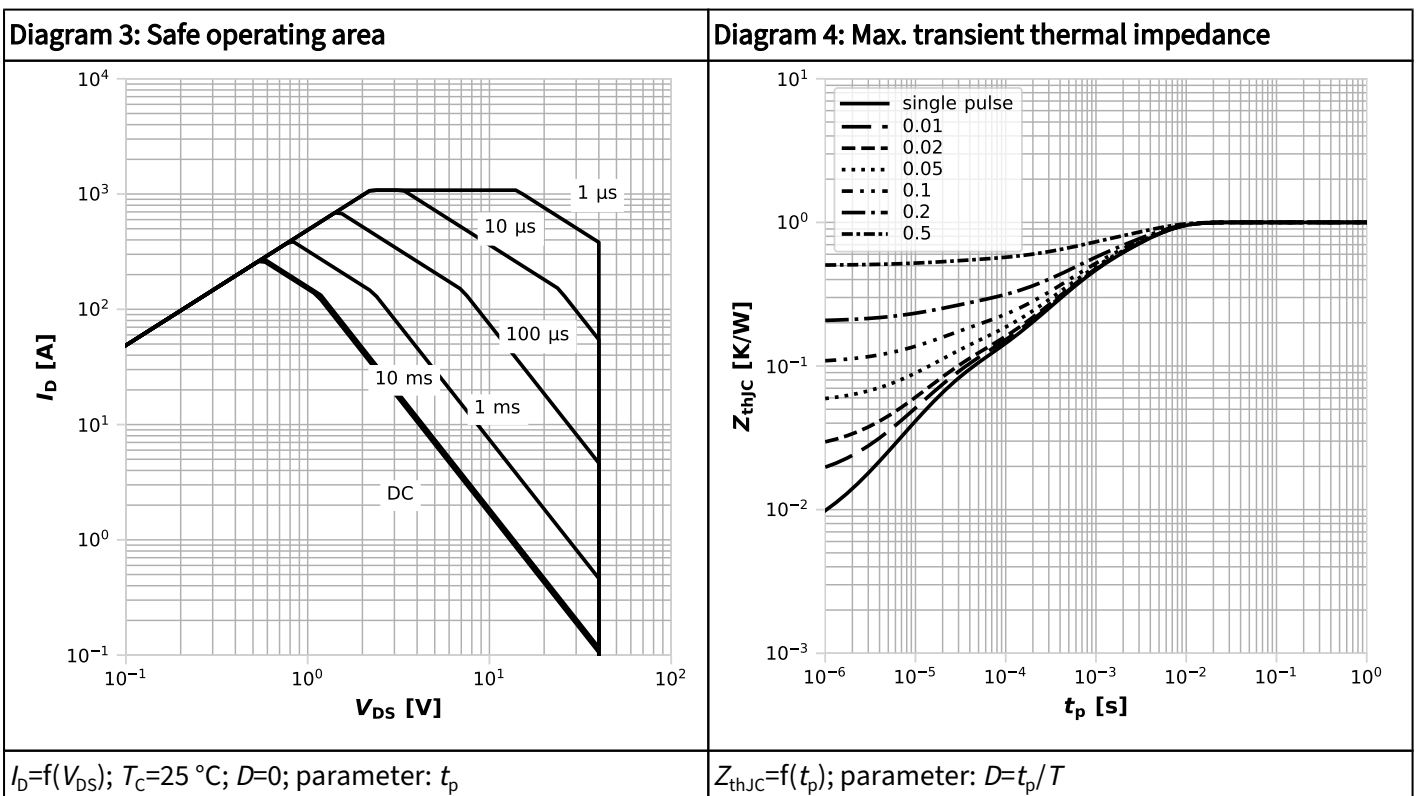
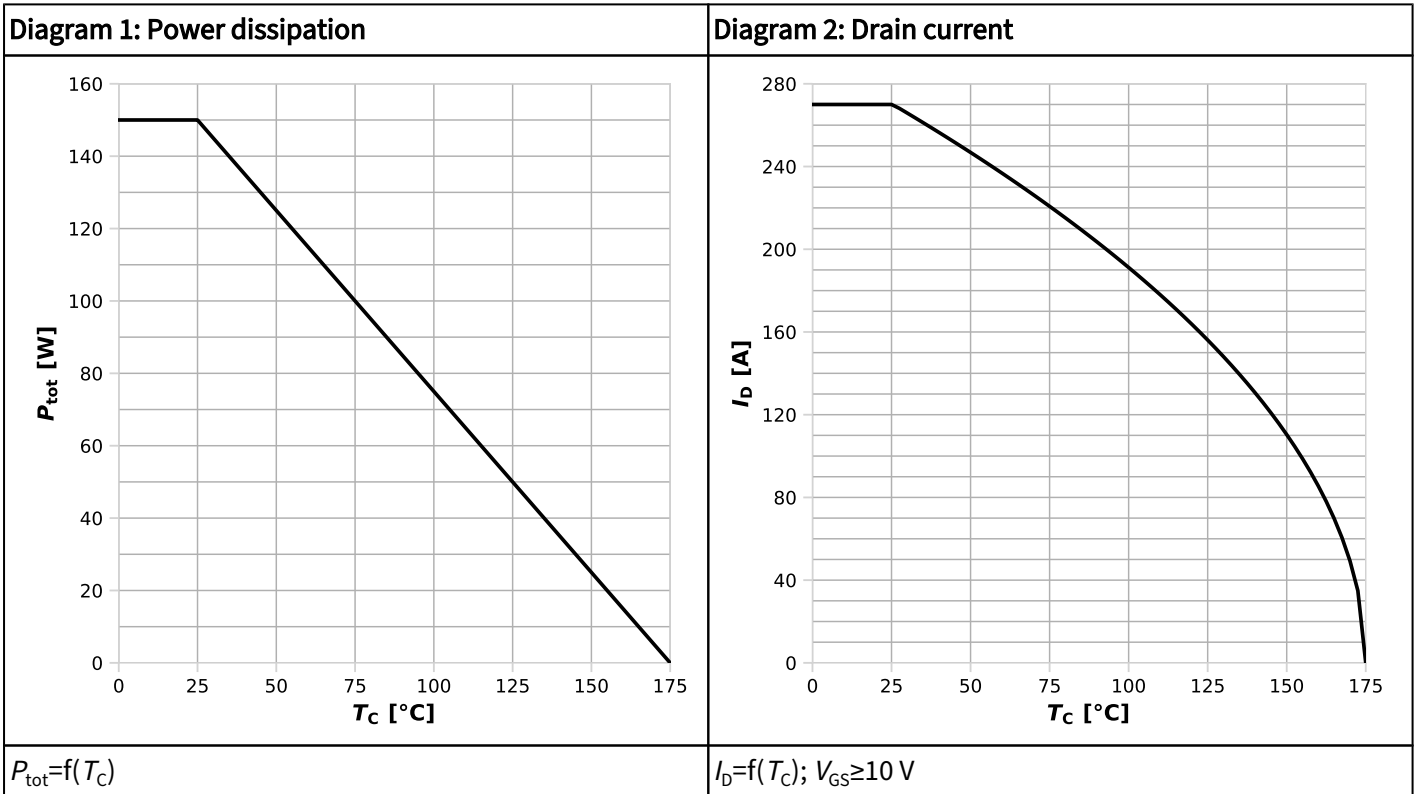
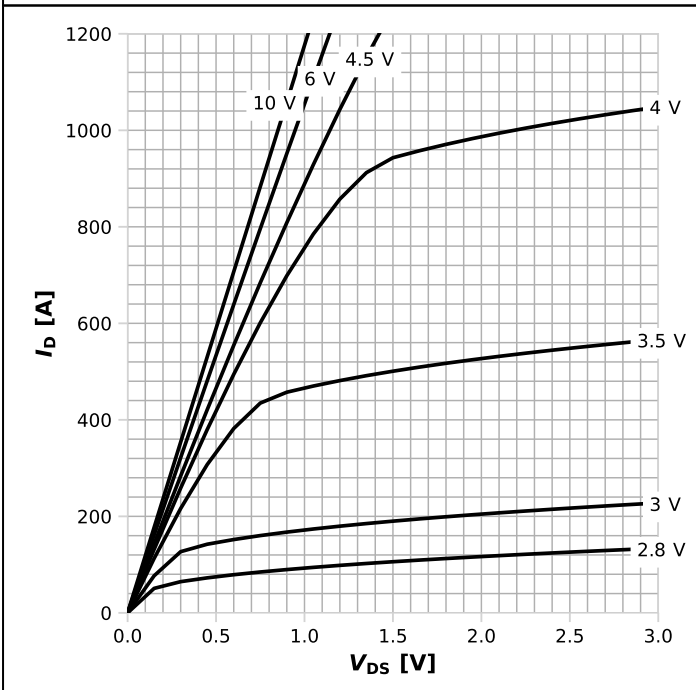
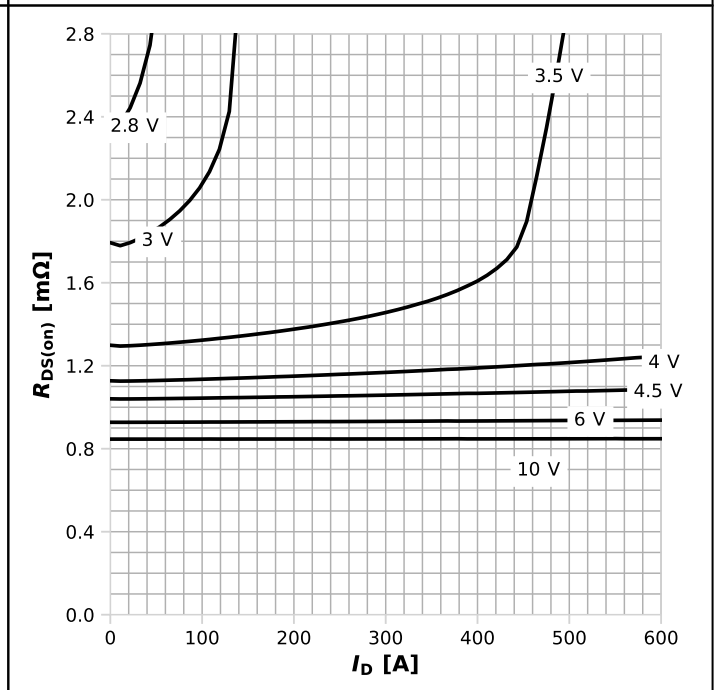


Diagram 5: Typ. output characteristics



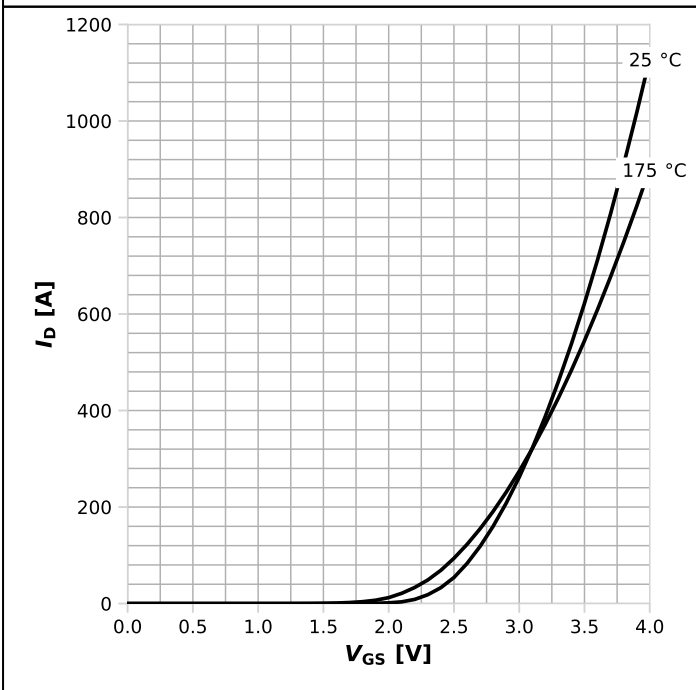
$I_D = f(V_{DS}), T_j = 25\text{ °C};$ parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



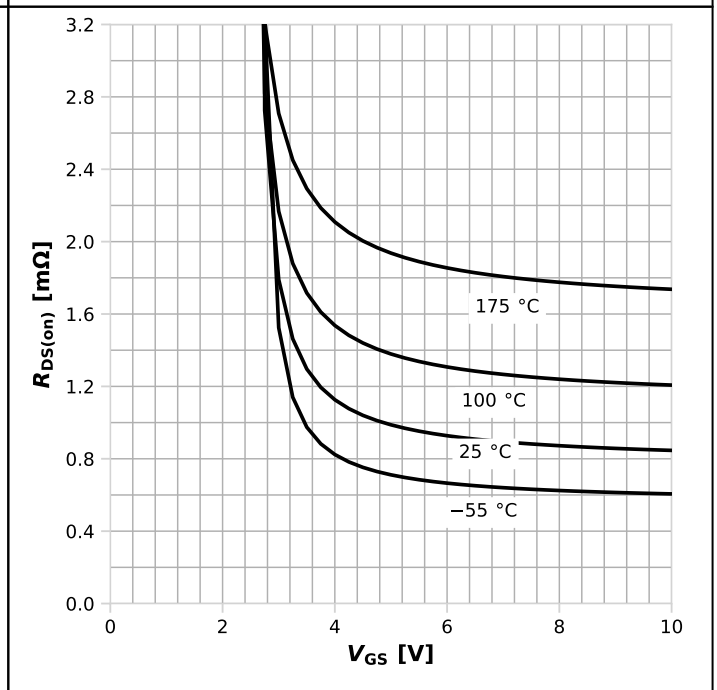
$R_{DS(on)} = f(I_D), T_j = 25\text{ °C};$ parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



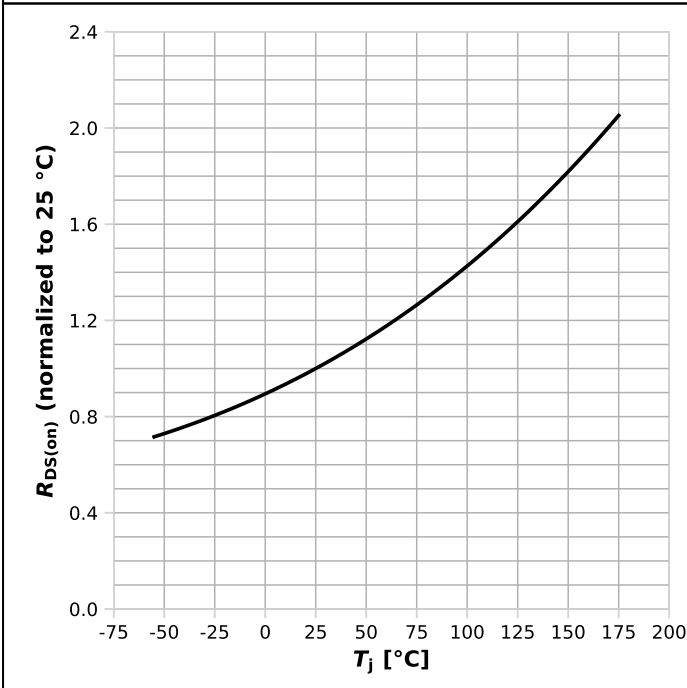
$I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)max};$ parameter: T_j

Diagram 8: Typ. drain-source on resistance



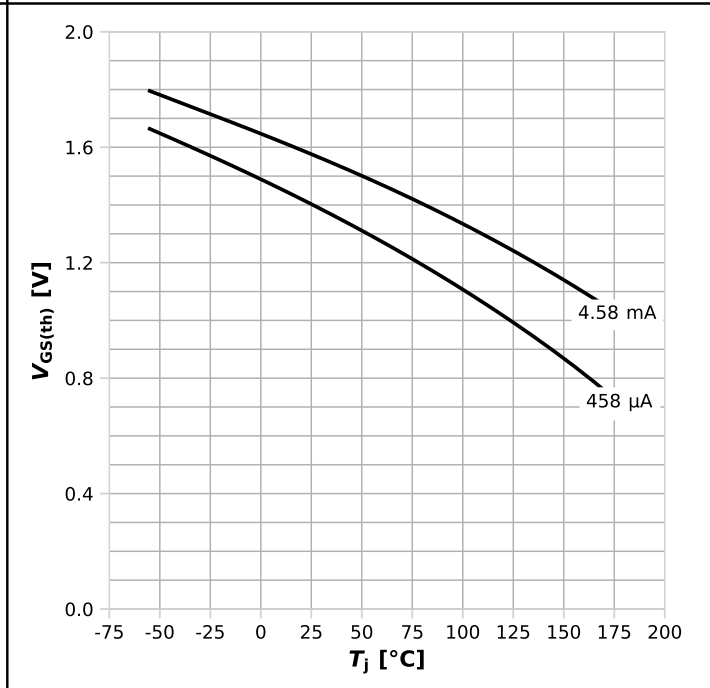
$R_{DS(on)} = f(V_{GS}), I_D = 20\text{ A};$ parameter: T_j

Diagram 9: Normalized drain-source on resistance



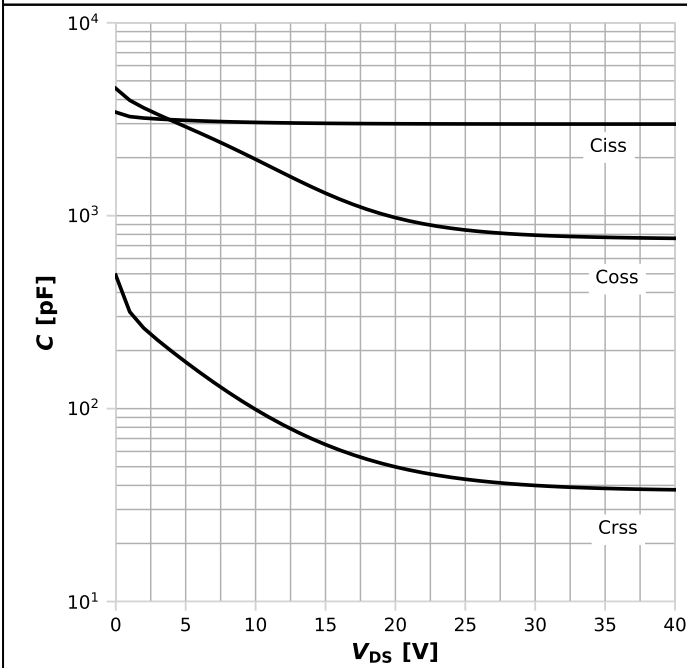
$R_{DS(on)}=f(T_j), I_D=20\text{ A}, V_{GS}=10\text{ V}$

Diagram 10: Typ. gate threshold voltage



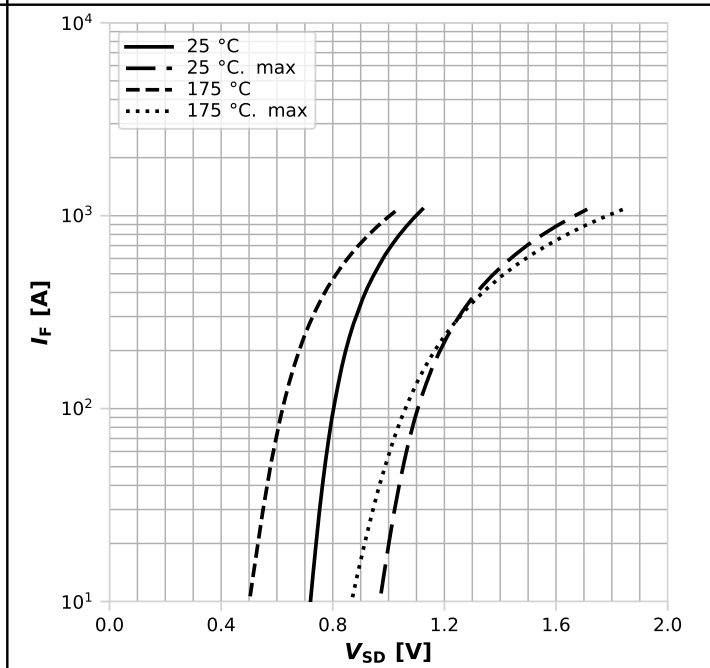
$V_{GS(th)}=f(T_j), V_{GS}=V_{DS}; \text{parameter: } I_D$

Diagram 11: Typ. capacitances



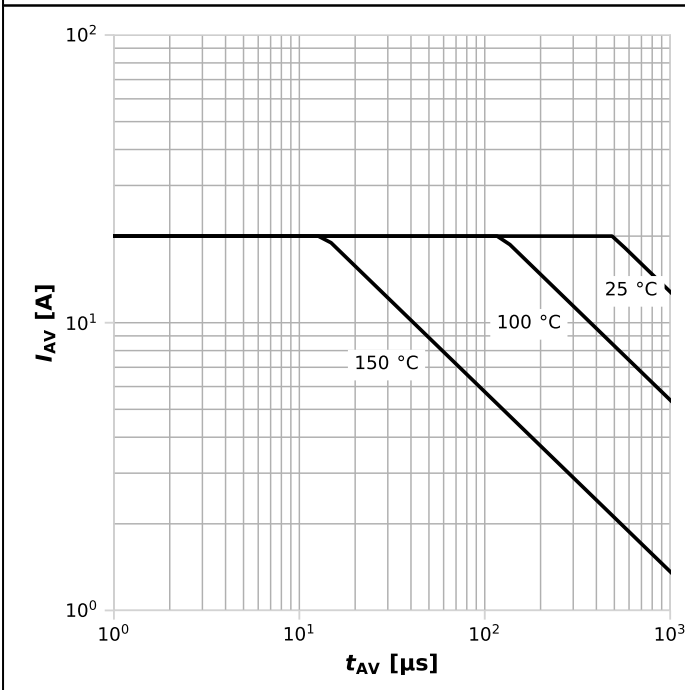
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$

Diagram 12: Forward characteristics of reverse diode



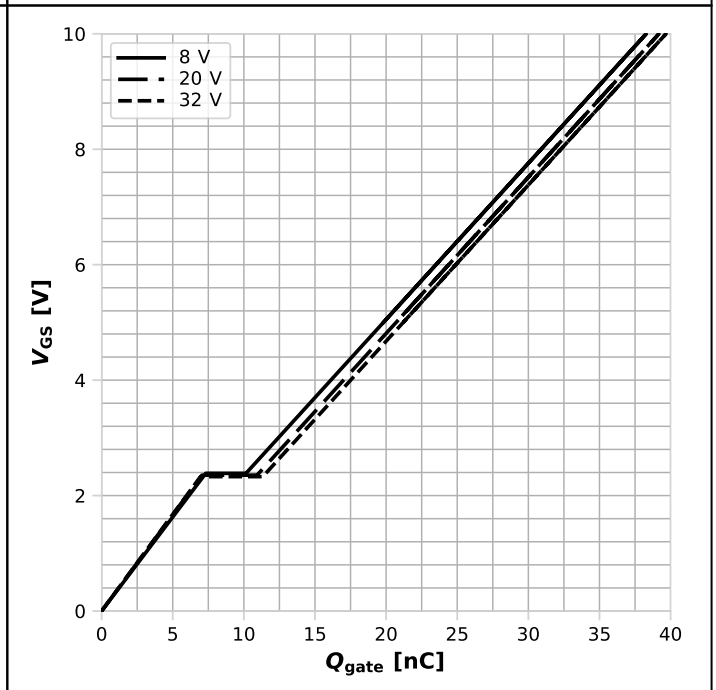
$I_F=f(V_{SD}); \text{parameter: } T_j$

Diagram 13: Avalanche characteristics



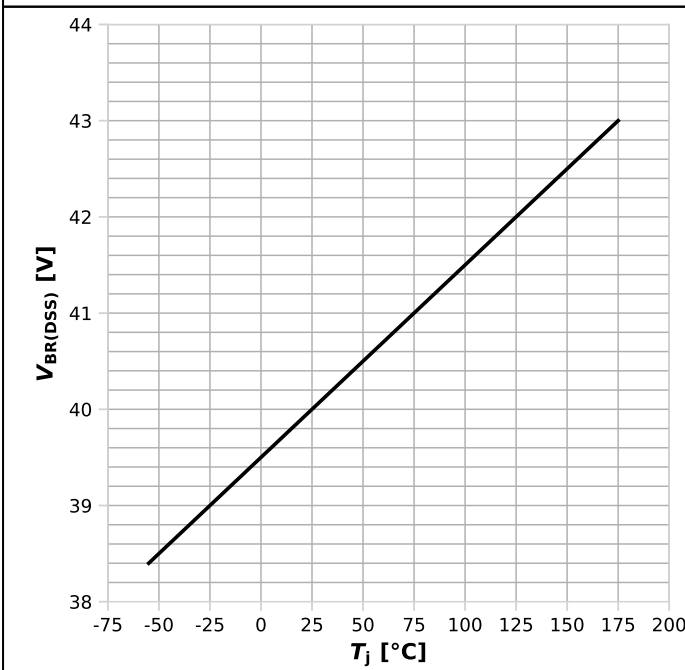
$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



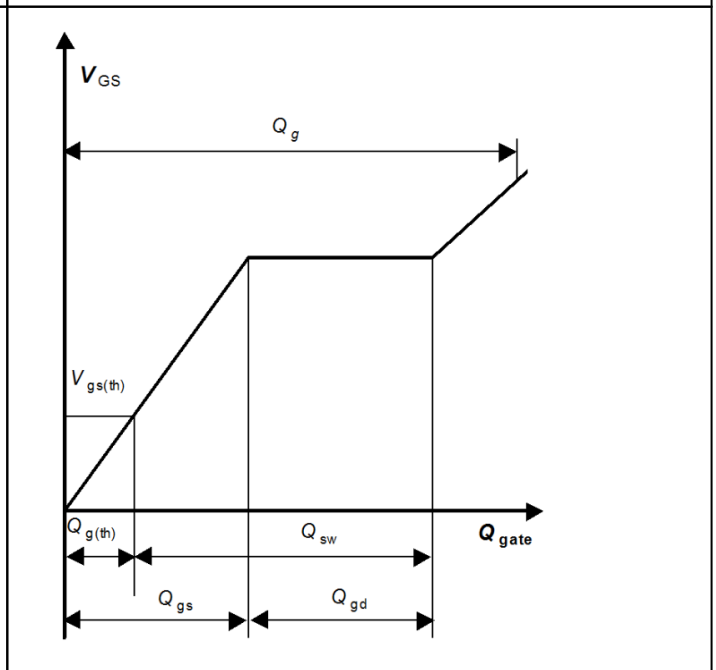
$V_{GS}=f(Q_{gate}), I_D=20$ A pulsed, $T_j=25$ °C; parameter: V_{DD}

Diagram 15: Min. drain-source breakdown voltage



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

Gate charge waveforms



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5 Package outlines

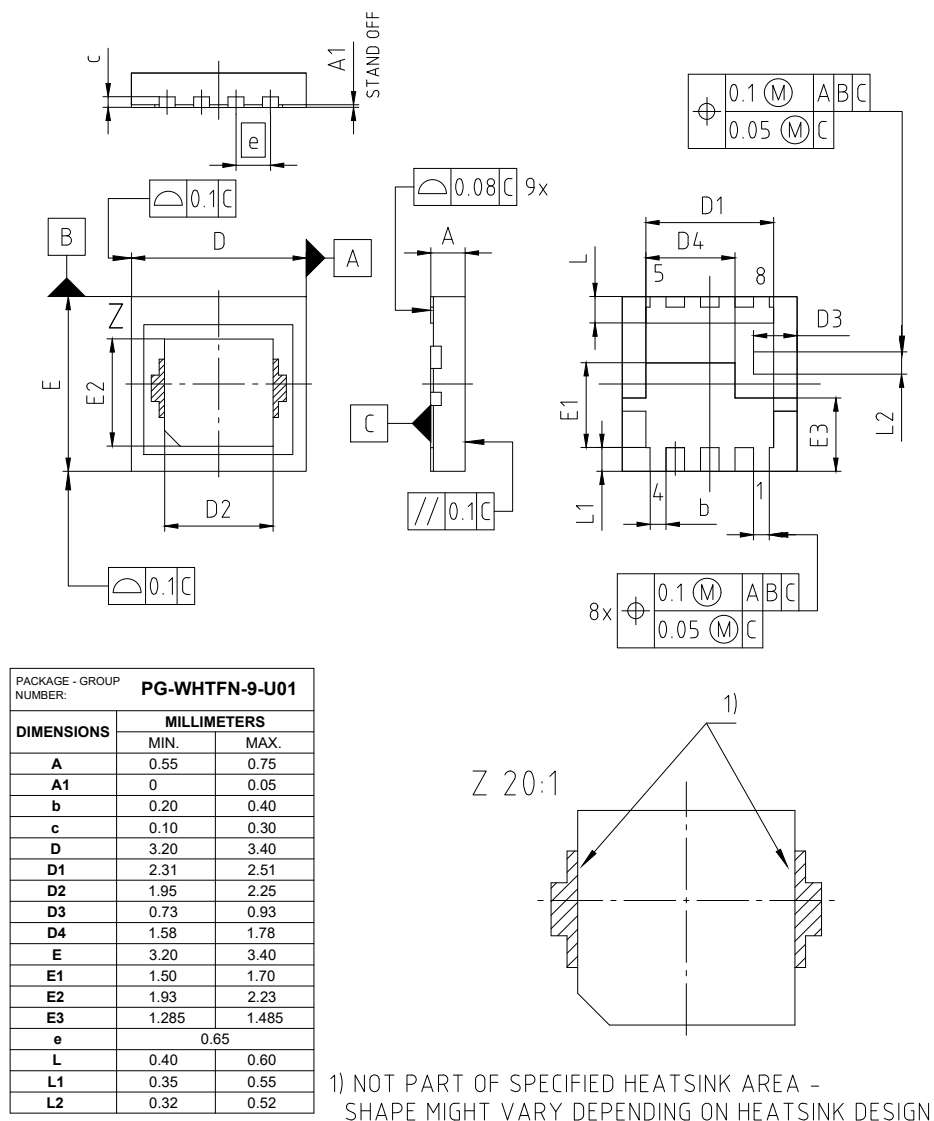


Figure 1 Outline PG-WHTFN-9, dimensions in mm

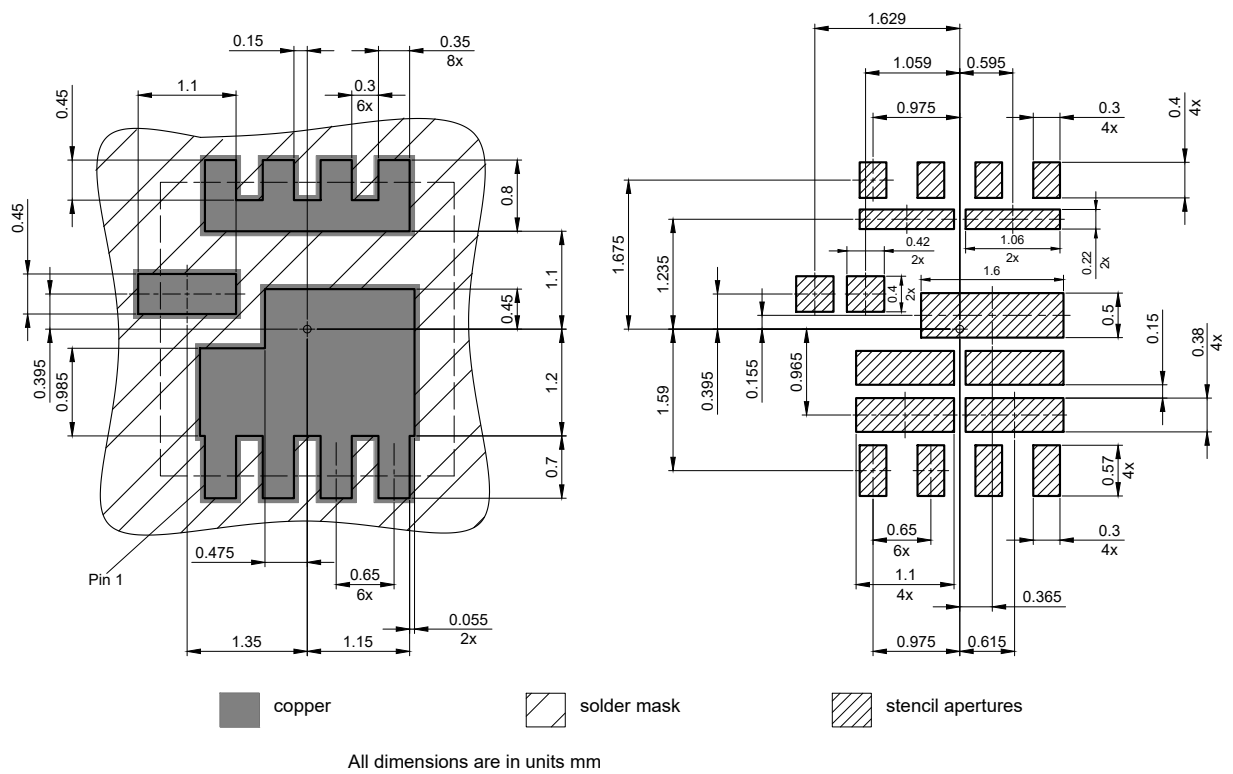


Figure 2 Footprint drawing PG-WHTFN-9, dimensions in mm

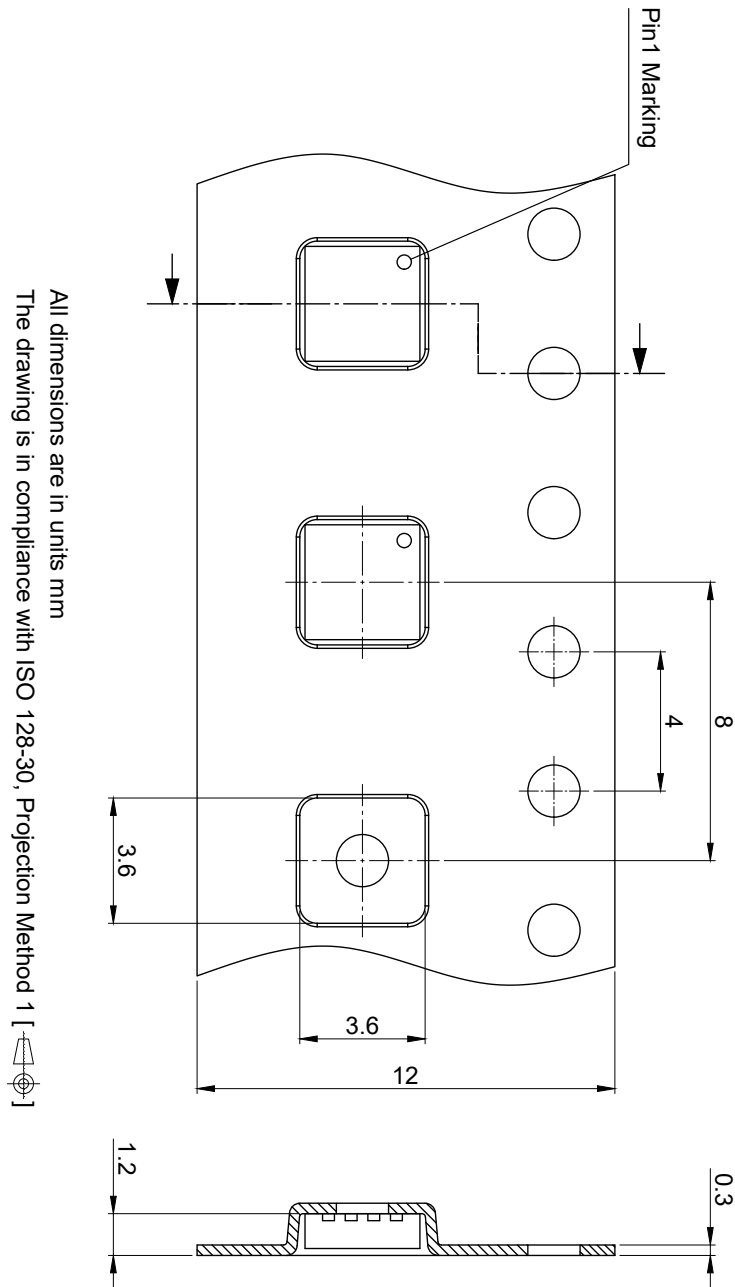


Figure 3 Packaging variant PG-WHTFN-9, dimensions in mm



Revision history

IQE010N04LM7CGSC

Revision 2026-02-09, Rev. 1.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2026-02-09	Release of final datasheet

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