

## MOSFET

### 600V CoolMOS™ CM8 Power Transistor

Built on Infineon's world-class super-junction MOSFET platform with an integrated fast body diode, making it suitable for a wide range of applications. It enables highest power density at lowest possible system cost with superior reliability. It is enhancing Infineon's WBG offering and the successor of the 600 V CoolMOS™ 7 MOSFET family.

### Features

- Best-In-Class SJ Mosfet Performance
- Address broad hard and soft switching applications with outstanding commutation ruggedness
- Integrated fast body diode and ESD protection
- .XT interconnection technology for best-in-class thermal performance

### Benefits

- Provides the best price performance ratio with Best-In-Class SJ Mosfet Performance
- Ease of use and shorter design in cycle
- Enable multiple topologies
- 14-42% lower  $R_{th}$  for improved thermal performance

### Potential applications

- Datacenter, AI server, Telecom Power Supply
- Micro and Residential Hybrid Inverter
- Portable and Residential Energy Storage, UPS
- EV Charging, Light electric vehicles, Electric Forklift
- High Voltage Solid State Power Distribution
- Home & Professional Tools
- Charger, Adapters, TV and Console SMPS

### Product validation

Fully qualified according to JEDEC for Industrial Applications

*Please note: For MOSFET paralleling the use of ferrite beads on the gate or separate totem poles is generally recommended.*

**Table 1 Key performance parameters**

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(on),max}$	24	mΩ
$Q_{g,typ}$	122	nC
$I_{D,pulse}$	359	A
$E_{oss} @ 400V$	16.4	μJ
Body diode $di_F/dt$	1300	A/μs

Type / Ordering code	Package	Marking	Related links
IPT60R024CM8	PG-HSOF-8	60R024C8	see Appendix A

TOLL

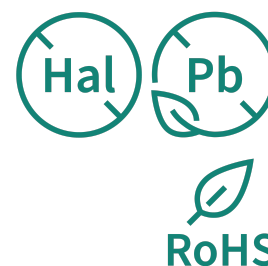
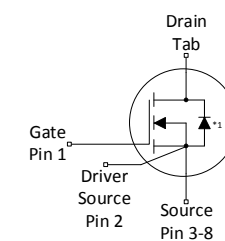
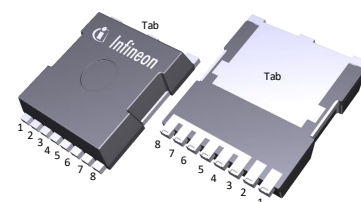




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# 1 Maximum ratings

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

**Table 2 Maximum ratings**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Continuous drain current <sup>1)</sup>	$I_D$	-	-	103	A	$T_C = 25^\circ\text{C}$
Continuous drain current	$I_D$	-	-	64	A	$T_C = 100^\circ\text{C}$
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	-	-	359	A	$T_C = 25^\circ\text{C}$
Avalanche energy, single pulse	$E_{AS}$	-	-	211	mJ	$I_D = 6.0\text{A}$ ; $V_{DD} = 50\text{V}$ ; see table 10
Avalanche energy, repetitive	$E_{AR}$	-	-	1.06	mJ	$I_D = 6.0\text{A}$ ; $V_{DD} = 50\text{V}$ ; see table 10
Avalanche current, single pulse	$I_{AS}$	-	-	6.0	A	-
MOSFET dv/dt ruggedness	dv/dt	-	-	120	V/ns	$V_{DS} = 0 \dots 400\text{V}$
Gate source voltage (static)	$V_{GS}$	-20	-	20	V	static;
Gate source voltage (dynamic)	$V_{GS}$	-30	-	30	V	AC ( $f > 1\text{ Hz}$ )
Power dissipation	$P_{tot}$	-	-	543	W	$T_C = 25^\circ\text{C}$
Storage temperature	$T_{stg}$	-55	-	150	$^\circ\text{C}$	-
Operating junction temperature	$T_j$	-55	-	150	$^\circ\text{C}$	-
Extended operating junction temperature	$T_j$	150	-	175	$^\circ\text{C}$	$\leq 50\text{ h}$ in the application lifetime
Mounting torque	-	-	-	-	Ncm	-
Continuous diode forward current	$I_S$	-	-	103	A	$T_C = 25^\circ\text{C}$
Diode pulse current <sup>2)</sup>	$I_{S,pulse}$	-	-	359	A	$T_C = 25^\circ\text{C}$
Reverse diode dv/dt <sup>3)</sup>	dv/dt	-	-	70	V/ns	$V_{DS} = 0 \dots 400\text{V}$ , $I_{SD} \leq 103\text{A}$ , $T_j = 25^\circ\text{C}$ see table 8
Maximum diode commutation speed	di <sub>F</sub> /dt	-	-	1300	A/ $\mu\text{s}$	$V_{DS} = 0 \dots 400\text{V}$ , $I_{SD} \leq 103\text{A}$ , $T_j = 25^\circ\text{C}$ see table 8
Insulation withstand voltage	$V_{ISO}$	-	-	n.a.	V	$V_{rms}$ , $T_C = 25^\circ\text{C}$ , $t = 1\text{min}$

<sup>1)</sup> Limited by  $T_{j,max}$ .

<sup>2)</sup> Pulse width  $t_p$  limited by  $T_{j,max}$

<sup>3)</sup> Identical low side and high side switch with identical  $R_G$

## 2 Thermal characteristics

**Table 3 Thermal characteristics**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	$R_{thJC}$	-	-	0.23	K/W	-
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	62	K/W	device on PCB, minimal footprint
Thermal resistance, junction - ambient for SMD version	$R_{thJA}$	-	-	-	K/W	Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm <sup>2</sup> (one layer, 70µm thickness) copper area for drain connection and cooling. PCB is vertical without air stream cooling.
Soldering temperature, wave- & reflow soldering allowed	$T_{sold}$	-	-	260	°C	reflow MSL1

### 3 Electrical characteristics

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

**Table 4 Static characteristics**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	600	-	-	V	$V_{GS}=0\text{V}$ , $I_D=1\text{mA}$
Gate threshold voltage	$V_{(GS)th}$	3.7	4.2	4.7	V	$V_{DS}=V_{GS}$ , $I_D=1.06\text{mA}$
Zero gate voltage drain current	$I_{DSS}$	-	-	1.5	$\mu\text{A}$	$V_{DS}=600\text{V}$ , $V_{GS}=0\text{V}$ , $T_j=25^\circ\text{C}$ $V_{DS}=600\text{V}$ , $V_{GS}=0\text{V}$ , $T_j=150^\circ\text{C}$
Gate-source leakage current	$I_{GSS}$	-	-	0.1	$\mu\text{A}$	$V_{GS}=20\text{V}$ , $V_{DS}=0\text{V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.020 0.044	0.024 -	$\Omega$	$V_{GS}=10\text{V}$ , $I_D=41.7\text{A}$ , $T_j=25^\circ\text{C}$ $V_{GS}=10\text{V}$ , $I_D=41.7\text{A}$ , $T_j=150^\circ\text{C}$
Gate resistance	$R_G$	-	1.1	-	$\Omega$	$f=1\text{MHz}$

**Table 5 Dynamic characteristics**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	$C_{iss}$	-	5382	-	pF	$V_{GS}=0\text{V}$ , $V_{DS}=400\text{V}$ , $f=250\text{kHz}$
Output capacitance	$C_{oss}$	-	66	-	pF	$V_{GS}=0\text{V}$ , $V_{DS}=400\text{V}$ , $f=250\text{kHz}$
Effective output capacitance, energy related <sup>4)</sup>	$C_{o(er)}$	-	205	-	pF	$V_{GS}=0\text{V}$ , $V_{DS}=0...400\text{V}$
Effective output capacitance, time related <sup>5)</sup>	$C_{o(tr)}$	-	2127	-	pF	$I_D=\text{constant}$ , $V_{GS}=0\text{V}$ , $V_{DS}=0...400\text{V}$
Turn-on delay time	$t_{d(on)}$	-	23.4	-	ns	$V_{DD}=400\text{V}$ , $V_{GS}=13\text{V}$ , $I_D=21.1\text{A}$ , $R_G=3.3\Omega$ ; see table 9
Rise time	$t_r$	-	7.1	-	ns	$V_{DD}=400\text{V}$ , $V_{GS}=13\text{V}$ , $I_D=21.1\text{A}$ , $R_G=3.3\Omega$ ; see table 9
Turn-off delay time	$t_{d(off)}$	-	111.4	-	ns	$V_{DD}=400\text{V}$ , $V_{GS}=13\text{V}$ , $I_D=21.1\text{A}$ , $R_G=3.3\Omega$ ; see table 9
Fall time	$t_f$	-	4.9	-	ns	$V_{DD}=400\text{V}$ , $V_{GS}=13\text{V}$ , $I_D=21.1\text{A}$ , $R_G=3.3\Omega$ ; see table 9

<sup>4)</sup>  $C_{o(er)}$  is a fixed capacitance that gives the same stored energy as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 400V

<sup>5)</sup>  $C_{o(tr)}$  is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 400V

**Table 6 Gate charge characteristics**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	$Q_{gs}$	-	32	-	nC	$V_{DD}=400\text{V}$ , $I_D=21.1\text{A}$ , $V_{GS}=0$ to 10V
Gate to drain charge	$Q_{gd}$	-	43	-	nC	$V_{DD}=400\text{V}$ , $I_D=21.1\text{A}$ , $V_{GS}=0$ to 10V

**Table 6 Gate charge characteristics**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate charge total	$Q_g$	-	122	-	nC	$V_{DD}=400V$ , $I_D=21.1A$ , $V_{GS}=0$ to $10V$
Gate plateau voltage	$V_{plateau}$	-	5.9	-	V	$V_{DD}=400V$ , $I_D=21.1A$ , $V_{GS}=0$ to $10V$

**Table 7 Reverse diode characteristics**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode forward voltage	$V_{SD}$	-	0.9	-	V	$V_{GS}=0V$ , $I_F=21.1A$ , $T_J=25^\circ C$
Reverse recovery time	$t_{rr}$	-	149.8	187.3	ns	$V_R=400V$ , $I_F=21.1A$ , $di_F/dt=100A/\mu s$ ; see table 8
Reverse recovery charge	$Q_{rr}$	-	1.11	1.66	$\mu C$	$V_R=400V$ , $I_F=21.1A$ , $di_F/dt=100A/\mu s$ ; see table 8
Peak reverse recovery current	$I_{rrm}$	-	16.1	-	A	$V_R=400V$ , $I_F=21.1A$ , $di_F/dt=100A/\mu s$ ; see table 8

4 Electrical characteristics diagrams

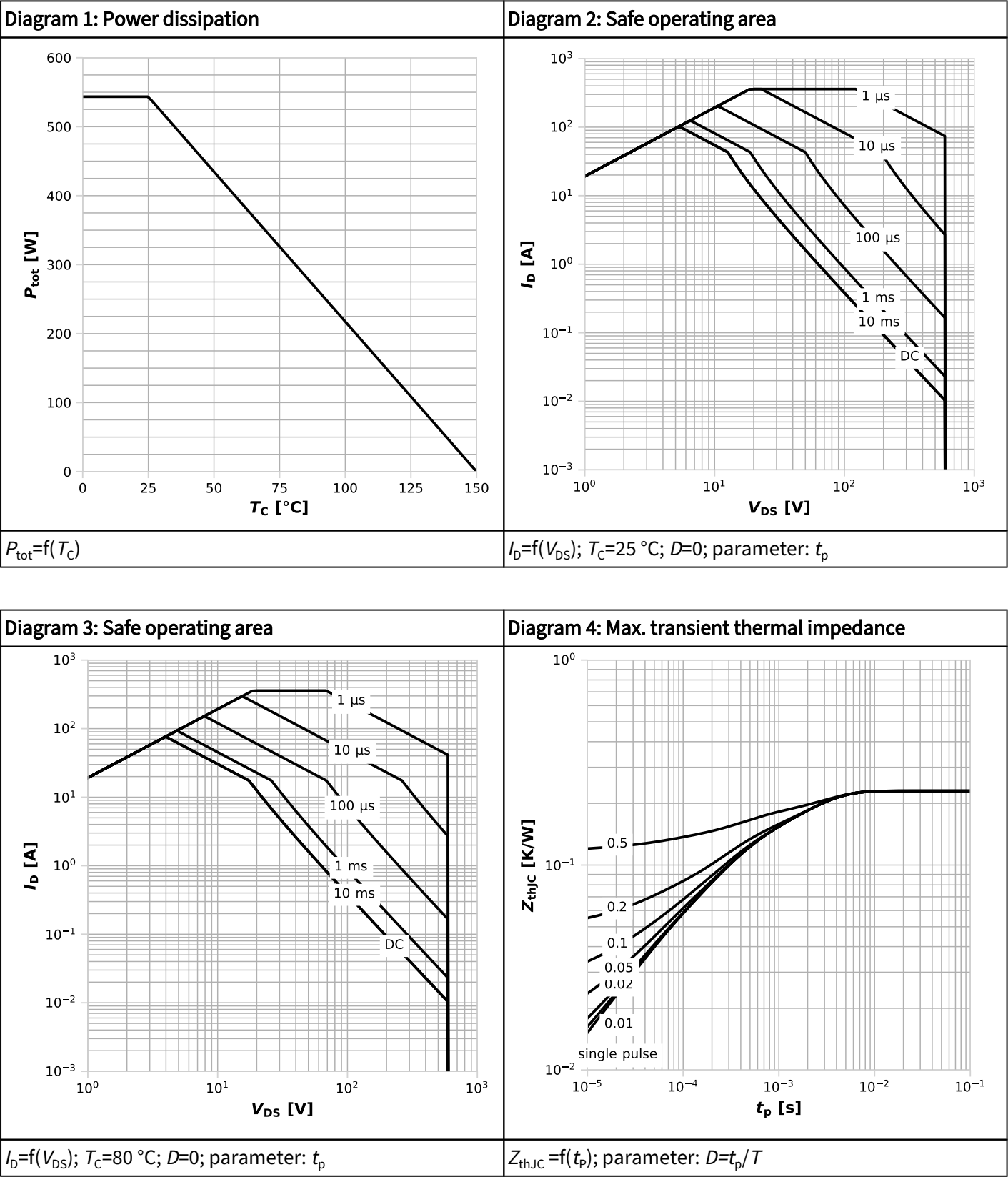
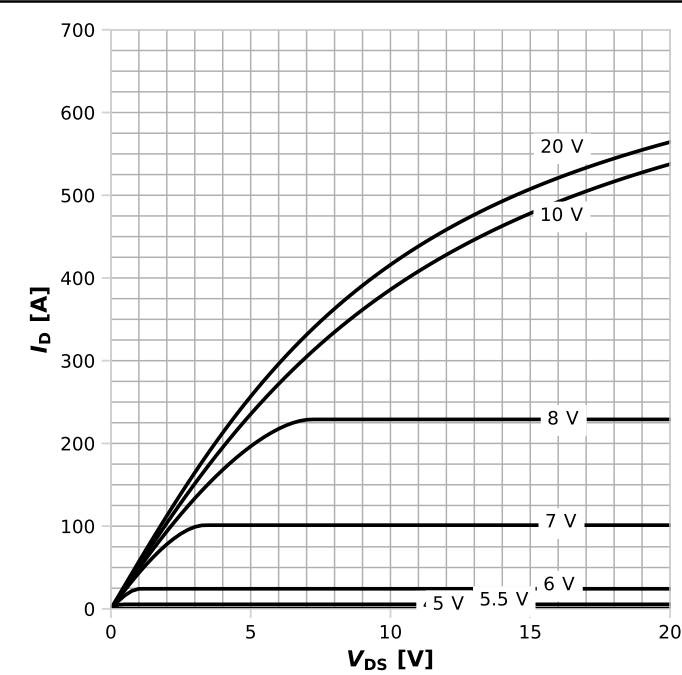
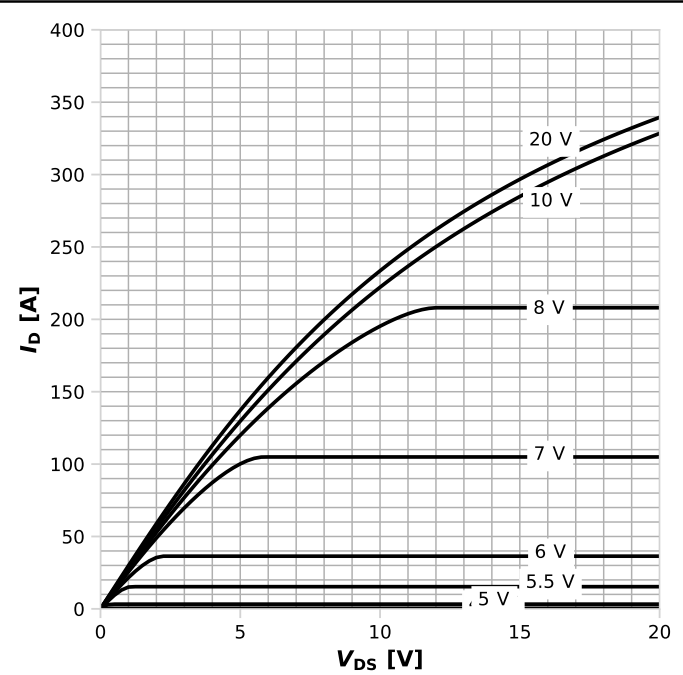


Diagram 5: Typ. output characteristics



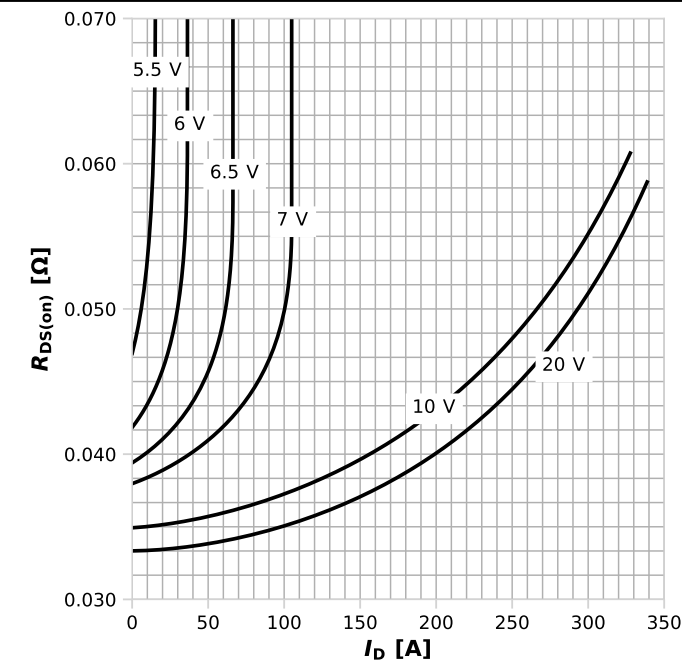
$I_D = f(V_{DS})$ ;  $T_j = 25\text{ °C}$ ; parameter:  $V_{GS}$

Diagram 6: Typ. output characteristics



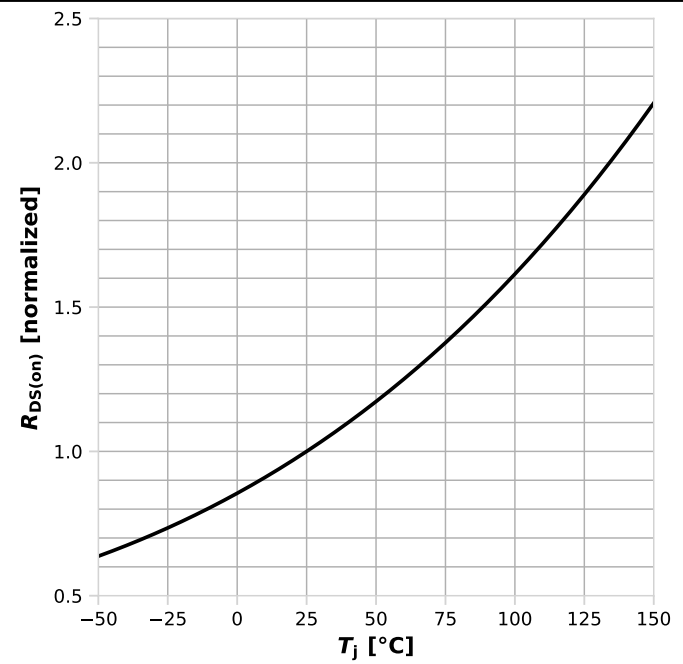
$I_D = f(V_{DS})$ ;  $T_j = 125\text{ °C}$ ; parameter:  $V_{GS}$

Diagram 7: Typ. drain-source on-state resistance



$R_{DS(on)} = f(I_D)$ ;  $T_j = 125\text{ °C}$ ; parameter:  $V_{GS}$

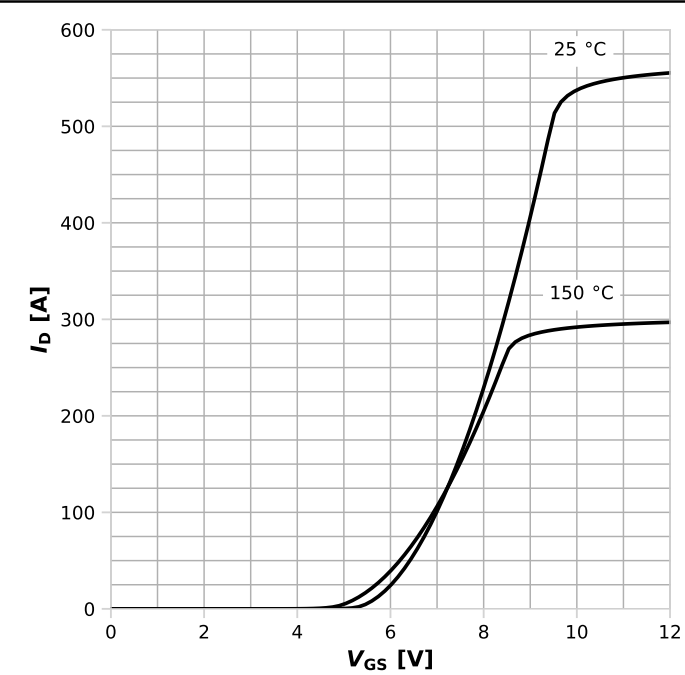
Diagram 8: Drain-source on-state resistance



$R_{DS(on)} = f(T_j)$ ;  $I_D = 41.7\text{ A}$ ;  $V_{GS} = 10\text{ V}$

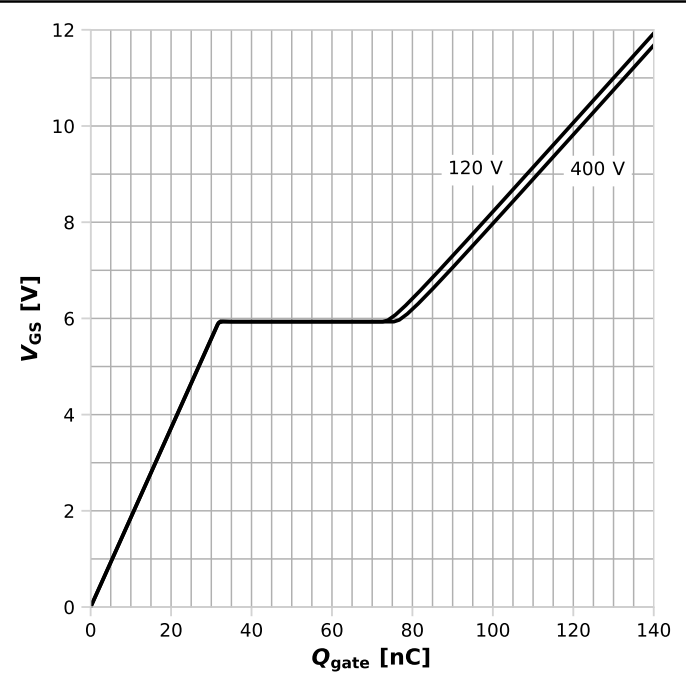


Diagram 9: Typ. transfer characteristics



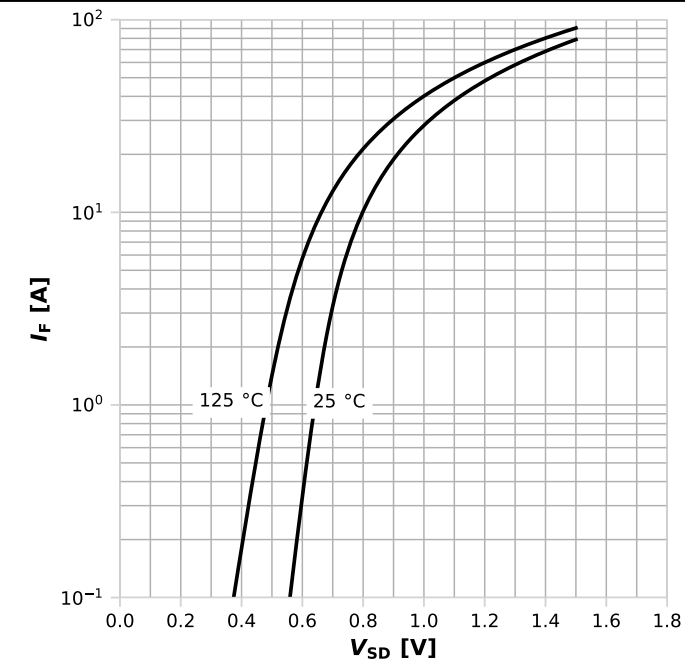
$I_D=f(V_{GS})$ ;  $V_{DS}=20V$ ; parameter:  $T_j$

Diagram 10: Typ. gate charge



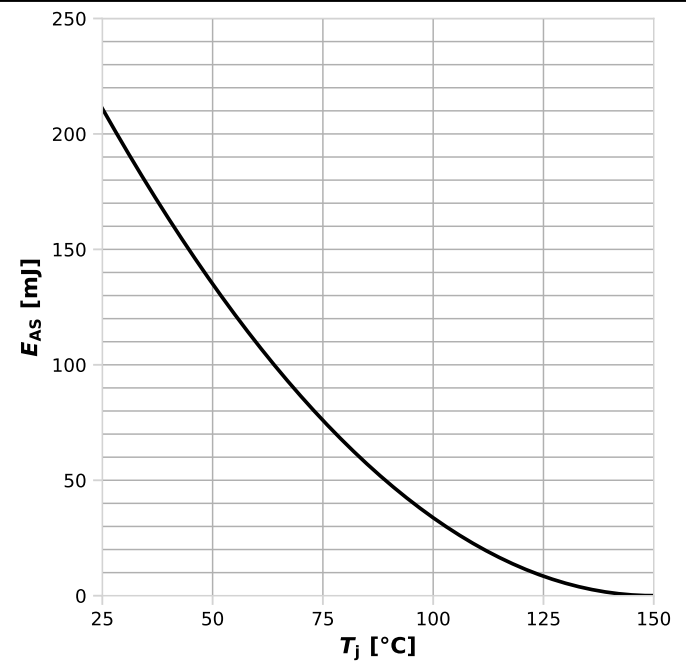
$V_{GS}=f(Q_{gate})$ ;  $I_D=21.1$  A pulsed; parameter:  $V_{DD}$

Diagram 11: Forward characteristics of reverse diode



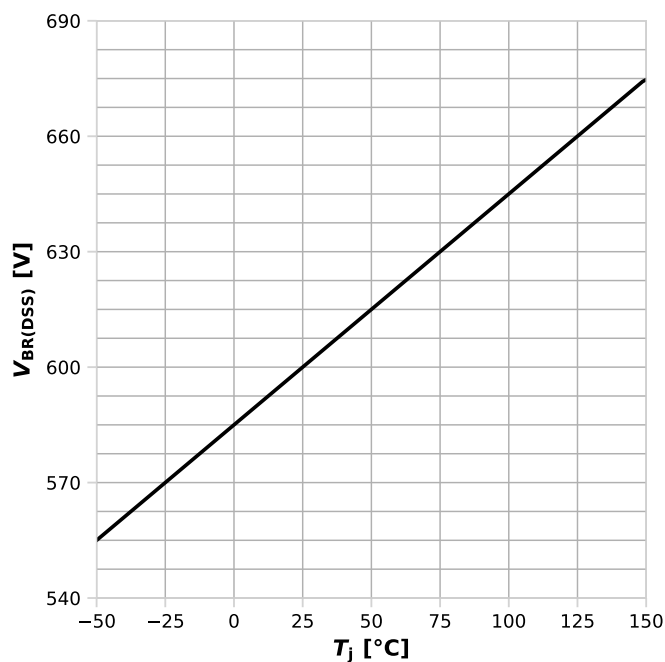
$I_F=f(V_{SD})$ ; parameter:  $T_j$

Diagram 12: Avalanche energy



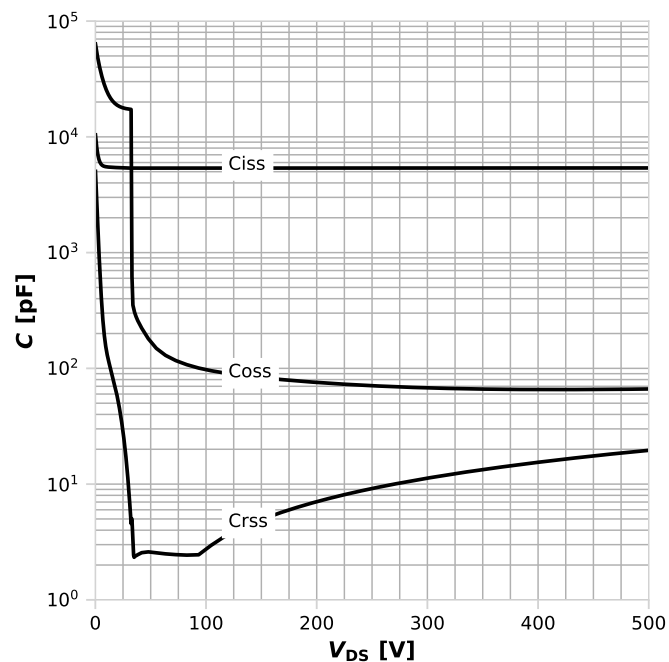
$E_{AS}=f(T_j)$ ;  $I_D=6.0$  A;  $V_{DD}=50$  V

**Diagram 13: Drain-source breakdown voltage**



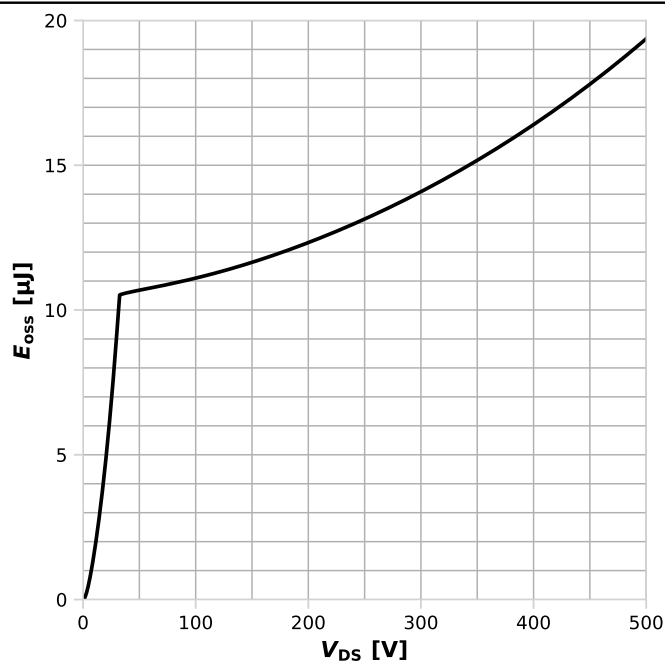
$$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$$

**Diagram 14: Typ. capacitances**



$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 250 \text{ kHz}$$

**Diagram 15: Typ. Coss stored energy**



$$E_{oss} = f(V_{DS})$$

5 Test circuits

Table 8 Diode characteristics

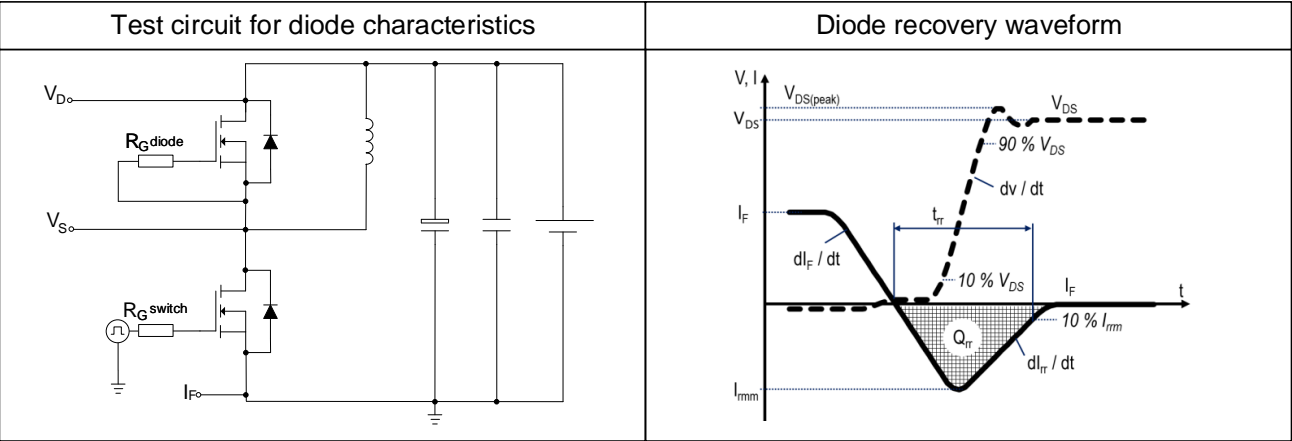


Table 9 Switching times

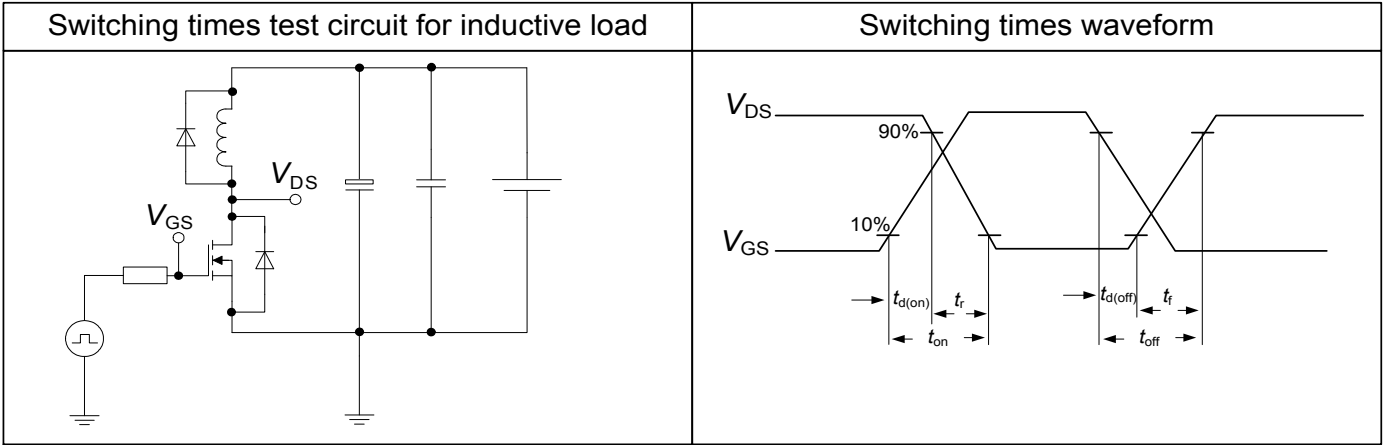
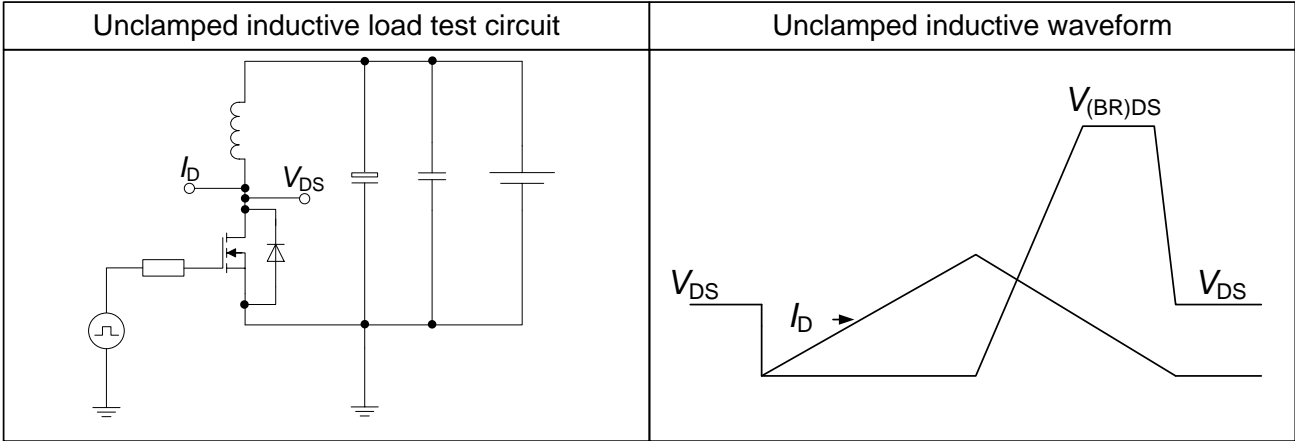
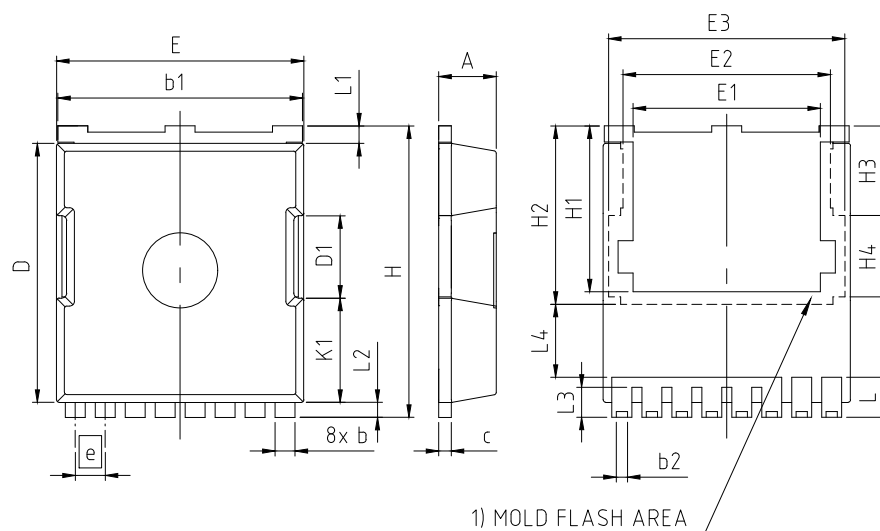


Table 10 Unclamped inductive load



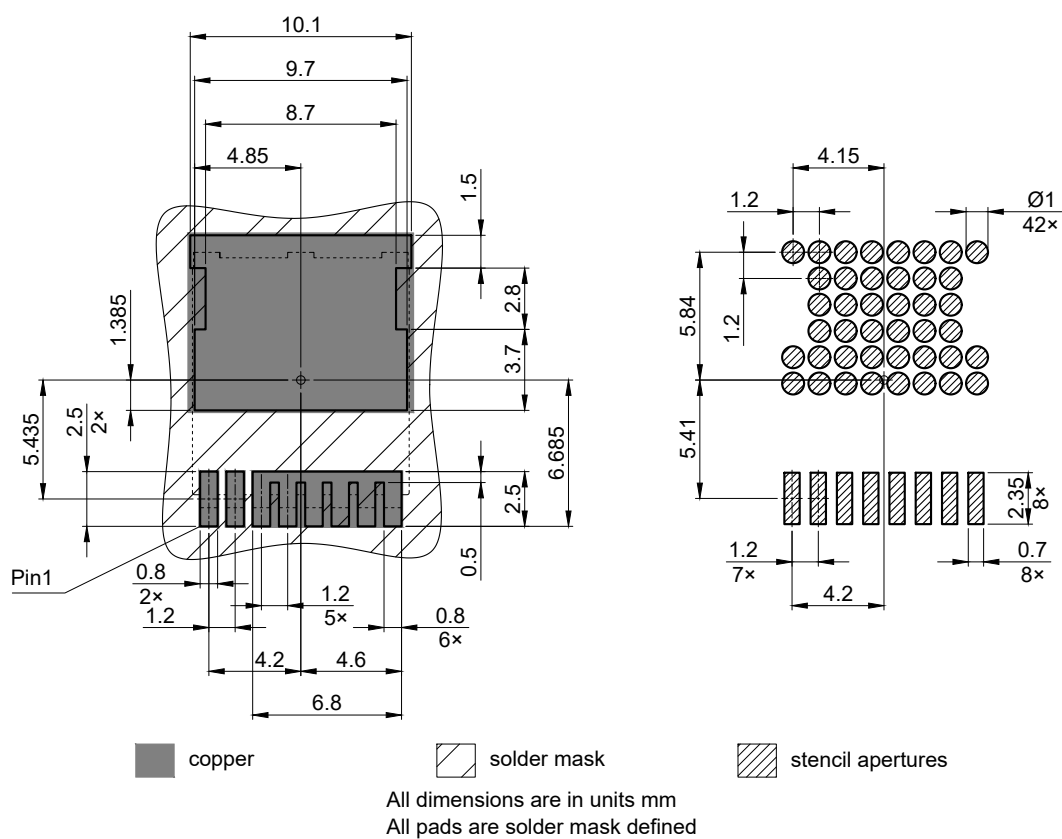
## 6 Package outlines

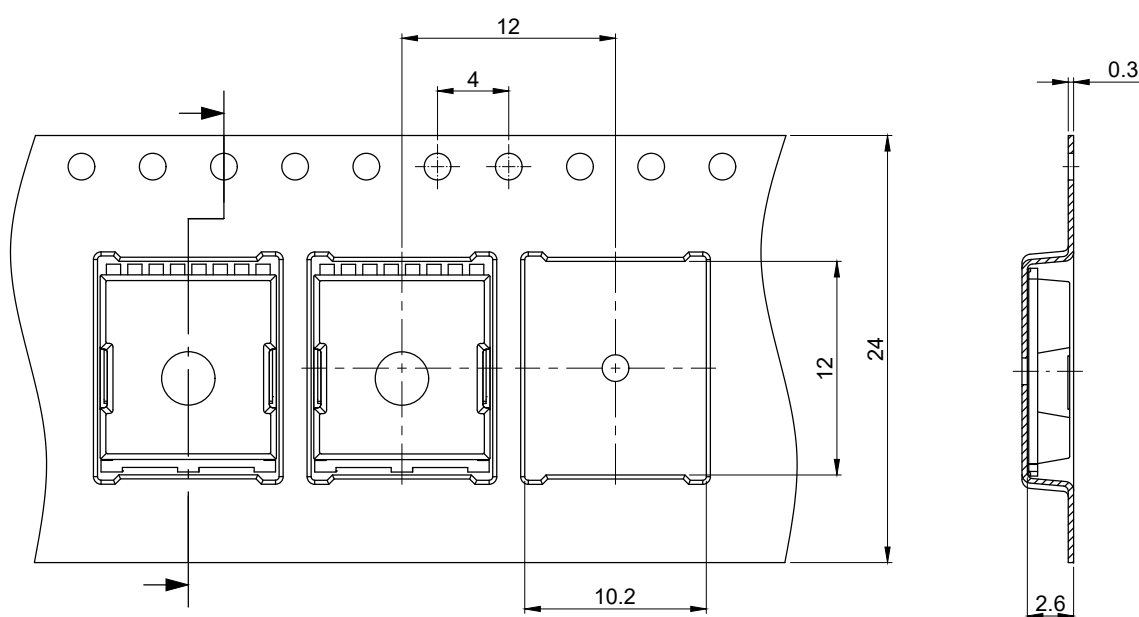


PACKAGE - GROUP NUMBER: PG-HSOF-8-U02		
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	2.20	2.40
b	0.70	0.90
b1	9.70	9.90
b2	0.42	0.50
c	0.40	0.60
D	10.28	10.58
D1	3.30	
E	9.70	10.10
E1	7.50	
E2	8.50	
E3	9.46	
e	1.20 (BSC)	
H	11.48	11.88
H1	6.55	6.95
H2	7.15	
H3	3.59	
H4	3.26	
N	8	
K1	4.18	
L	1.40	1.80
L1	0.50	0.90
L2	0.50	0.70
L3	1.00	1.30
L4	2.62	2.81


1) PARTIALLY COVERED WITH MOLD FLASH

**Figure 1** Outline PG-HSOF-8, dimensions in mm


**Figure 2 Footprint drawing PG-HSOF-8, dimensions in mm**



All dimensions are in units mm

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

**Figure 3** Packaging variant PG-HSOF-8, dimensions in mm

## 7 Appendix A

**Table 11**    **Related links**

- [IFX CoolMOS CM8 Webpage](#)
- [IFX CoolMOS CM8 application note](#)
- [IFX CoolMOS CM8 simulation model](#)
- [IFX Design tools](#)



**Revision history**

IPT60R024CM8

**Revision 2024-10-30, Rev. 2.0**

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2024-10-30	Rth change, Update of SOA diagram scaling

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