

MOSFET

PG-TO247-3

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

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
$R_{DS(on),max}$	99	mΩ
$Q_{g,typ}$	31	nC
$I_{D,pulse}$	87	A
$E_{oss} @ 400V$	4.2	μJ
Body diode di_F/dt	1300	A/μs

Type / Ordering code	Package	Marking	Related links
IPW60R099CM8	PG-TO247-3	60R099C8	see Appendix A

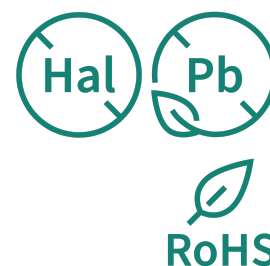
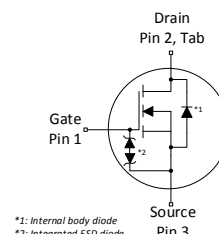
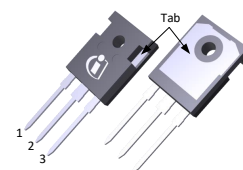




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1 Maximum ratings

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 ¹⁾	I_D	-	-	29	A	$T_C = 25^\circ\text{C}$
Continuous drain current	I_D	-	-	18	A	$T_C = 100^\circ\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$	-	-	87	A	$T_C = 25^\circ\text{C}$
Avalanche energy, single pulse	E_{AS}	-	-	51	mJ	$I_D = 2.7\text{A}$; $V_{DD} = 50\text{V}$; see table 10
Avalanche energy, repetitive	E_{AR}	-	-	0.26	mJ	$I_D = 2.7\text{A}$; $V_{DD} = 50\text{V}$; see table 10
Avalanche current, single pulse	I_{AS}	-	-	2.7	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}	-	-	176	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	-	-	-	60	Ncm	M3 and M3.5 screws
Continuous diode forward current	I_S	-	-	29	A	$T_C = 25^\circ\text{C}$
Diode pulse current ²⁾	$I_{S,pulse}$	-	-	87	A	$T_C = 25^\circ\text{C}$
Reverse diode dv/dt ³⁾	dv/dt	-	-	70	V/ns	$V_{DS} = 0 \dots 400\text{V}$, $I_{SD} \leq 29\text{A}$, $T_j = 25^\circ\text{C}$ see table 8
Maximum diode commutation speed	di _F /dt	-	-	1300	A/ μs	$V_{DS} = 0 \dots 400\text{V}$, $I_{SD} \leq 29\text{A}$, $T_j = 25^\circ\text{C}$ see table 8
Insulation withstand voltage	V_{ISO}	-	-	n.a.	V	V_{rms} , $T_C = 25^\circ\text{C}$, $t = 1\text{min}$

¹⁾ Limited by $T_{j,max}$.

²⁾ Pulse width t_p limited by $T_{j,max}$

³⁾ 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}	-	-	0.71	K/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	62	K/W	leaded
Thermal resistance, junction - ambient for SMD version	R_{thJA}	-	-	-	K/W	-
Soldering temperature, wavesoldering only allowed at leads	T_{sold}	-	-	260	°C	1.6mm (0.063 in.) from case for 10s

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	$V_{DS}=V_{GS}$, $I_D=0.26\text{mA}$
Zero gate voltage drain current	I_{DSS}	-	- 35.5	1 -	μA	$V_{DS}=600\text{V}$, $V_{GS}=0\text{V}$, $T_j=25^\circ\text{C}$ $V_{DS}=600\text{V}$, $V_{GS}=0\text{V}$, $T_j=150^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	-	2	μA	$V_{GS}=20\text{V}$, $V_{DS}=0\text{V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.083 0.183	0.099 -	Ω	$V_{GS}=10\text{V}$, $I_D=10.1\text{A}$, $T_j=25^\circ\text{C}$ $V_{GS}=10\text{V}$, $I_D=10.1\text{A}$, $T_j=150^\circ\text{C}$
Gate resistance	R_G	-	8.9	-	Ω	$f=1\text{MHz}$

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	1330	-	pF	$V_{GS}=0\text{V}$, $V_{DS}=400\text{V}$, $f=250\text{kHz}$
Output capacitance	C_{oss}	-	18	-	pF	$V_{GS}=0\text{V}$, $V_{DS}=400\text{V}$, $f=250\text{kHz}$
Effective output capacitance, energy related ⁴⁾	$C_{o(er)}$	-	53	-	pF	$V_{GS}=0\text{V}$, $V_{DS}=0\dots400\text{V}$
Effective output capacitance, time related ⁵⁾	$C_{o(tr)}$	-	533	-	pF	$I_D=\text{constant}$, $V_{GS}=0\text{V}$, $V_{DS}=0\dots400\text{V}$
Turn-on delay time	$t_{d(on)}$	-	20.7	-	ns	$V_{DD}=400\text{V}$, $V_{GS}=13\text{V}$, $I_D=5.1\text{A}$, $R_G=5.3\Omega$; see table 9
Rise time	t_r	-	6.9	-	ns	$V_{DD}=400\text{V}$, $V_{GS}=13\text{V}$, $I_D=5.1\text{A}$, $R_G=5.3\Omega$; see table 9
Turn-off delay time	$t_{d(off)}$	-	93.2	-	ns	$V_{DD}=400\text{V}$, $V_{GS}=13\text{V}$, $I_D=5.1\text{A}$, $R_G=5.3\Omega$; see table 9
Fall time	t_f	-	10.2	-	ns	$V_{DD}=400\text{V}$, $V_{GS}=13\text{V}$, $I_D=5.1\text{A}$, $R_G=5.3\Omega$; see table 9

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

⁵⁾ $C_{o(tr)}$ 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}	-	8	-	nC	$V_{DD}=400\text{V}$, $I_D=5.1\text{A}$, $V_{GS}=0$ to 10V
Gate to drain charge	Q_{gd}	-	11	-	nC	$V_{DD}=400\text{V}$, $I_D=5.1\text{A}$, $V_{GS}=0$ to 10V

Table 6 Gate charge characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate charge total	Q_g	-	31	-	nC	$V_{DD}=400V$, $I_D=5.1A$, $V_{GS}=0$ to $10V$
Gate plateau voltage	$V_{plateau}$	-	6.0	-	V	$V_{DD}=400V$, $I_D=5.1A$, $V_{GS}=0$ 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	$V_{GS}=0V$, $I_F=5.1A$, $T_J=25^\circ C$
Reverse recovery time	t_{rr}	-	77.3	96.6	ns	$V_R=400V$, $I_F=5.1A$, $di_F/dt=100A/\mu s$; see table 8
Reverse recovery charge	Q_{rr}	-	0.30	0.45	μC	$V_R=400V$, $I_F=5.1A$, $di_F/dt=100A/\mu s$; see table 8
Peak reverse recovery current	I_{rrm}	-	7.8	-	A	$V_R=400V$, $I_F=5.1A$, $di_F/dt=100A/\mu s$; see table 8

4 Electrical characteristics diagrams

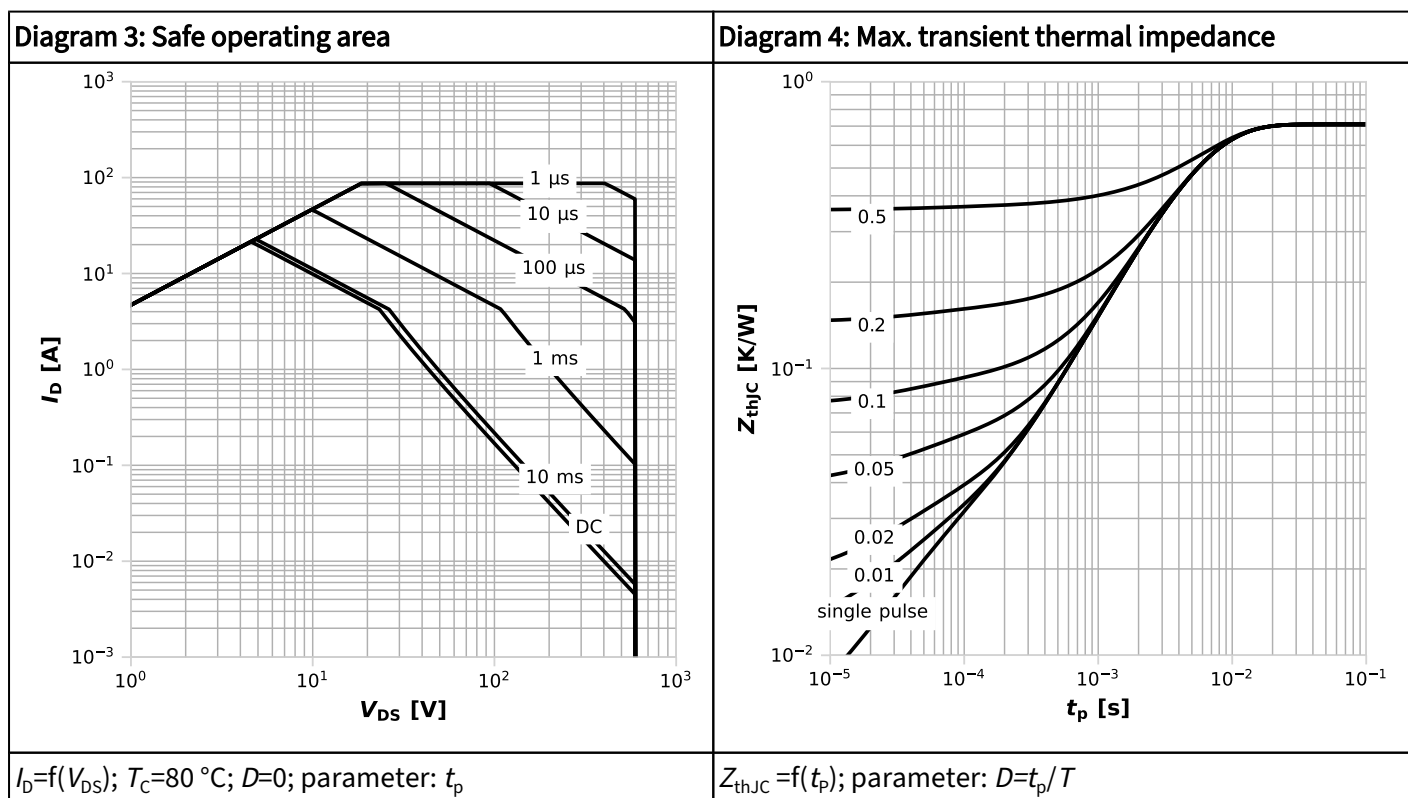
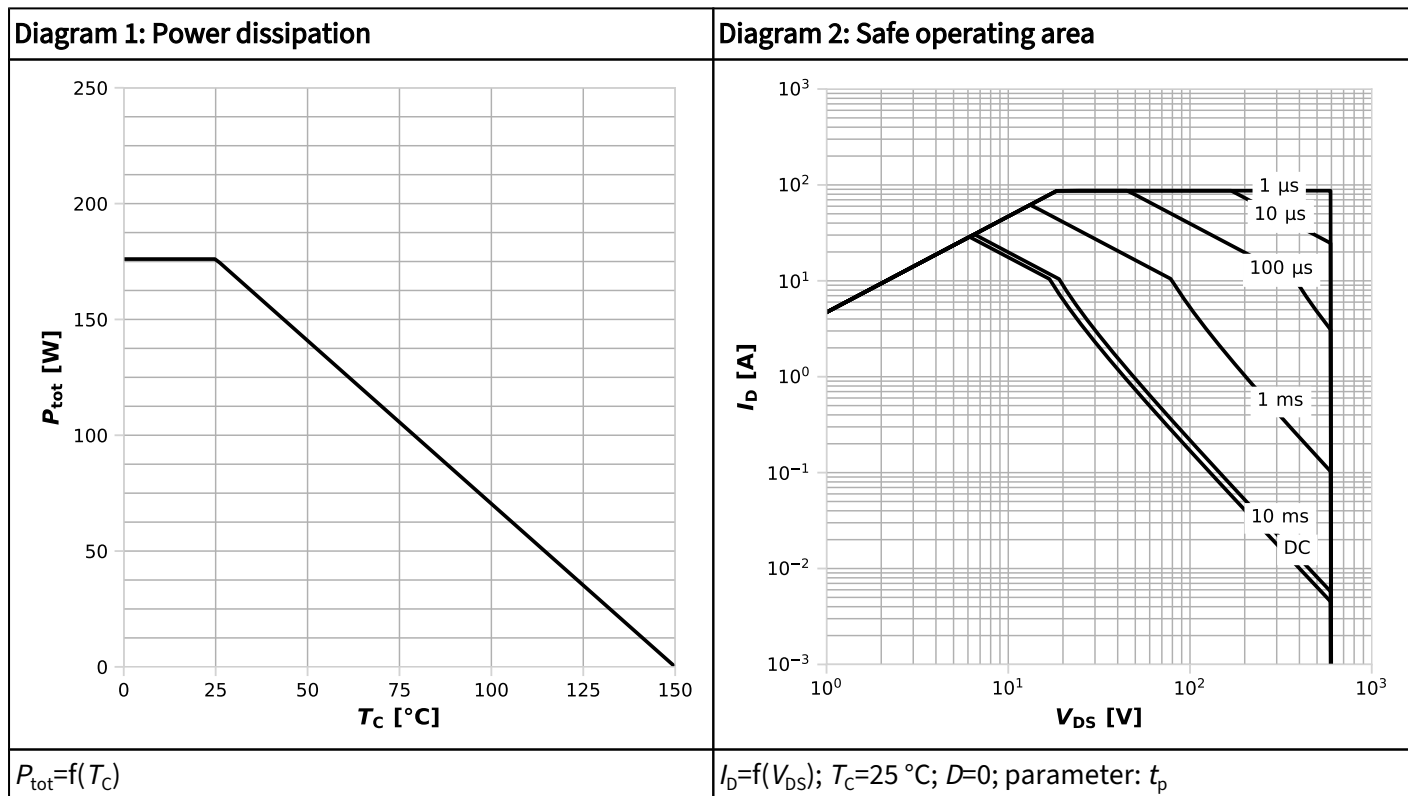
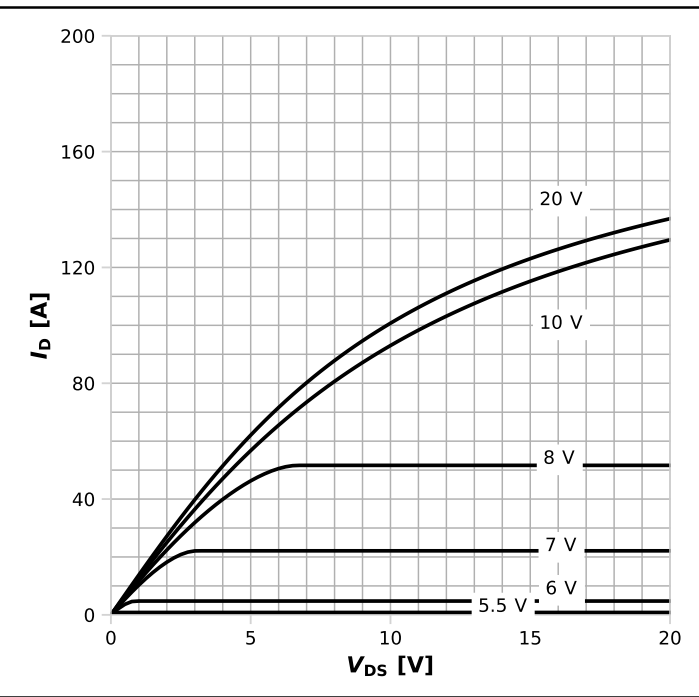
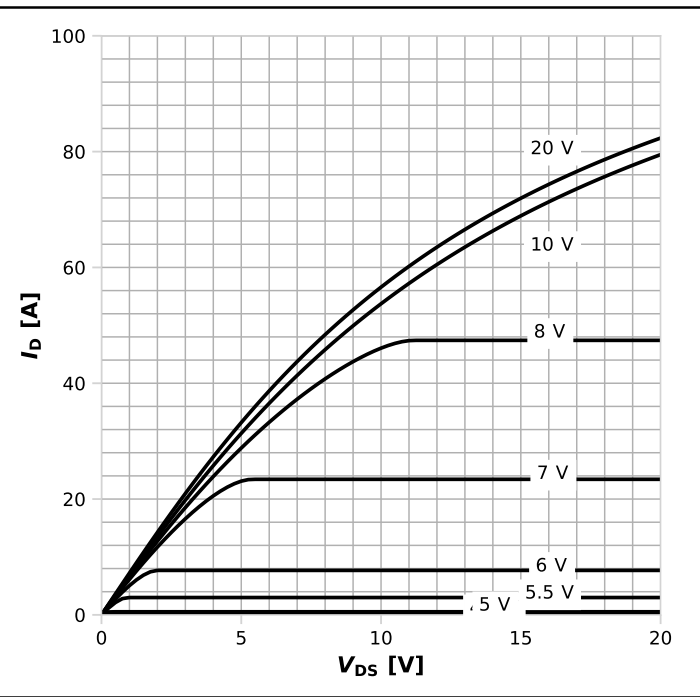


Diagram 5: Typ. output characteristics



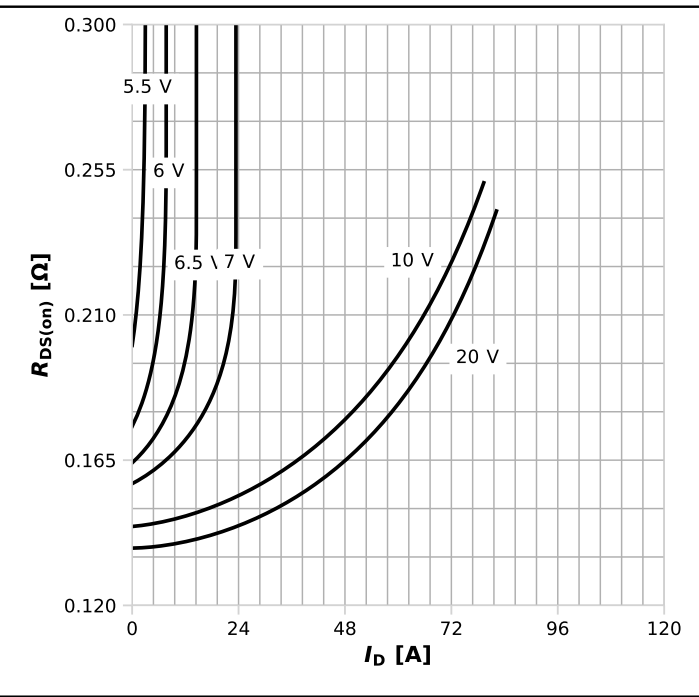
$I_D = f(V_{DS})$; $T_j = 25\text{ °C}$; parameter: V_{GS}

Diagram 6: Typ. output characteristics



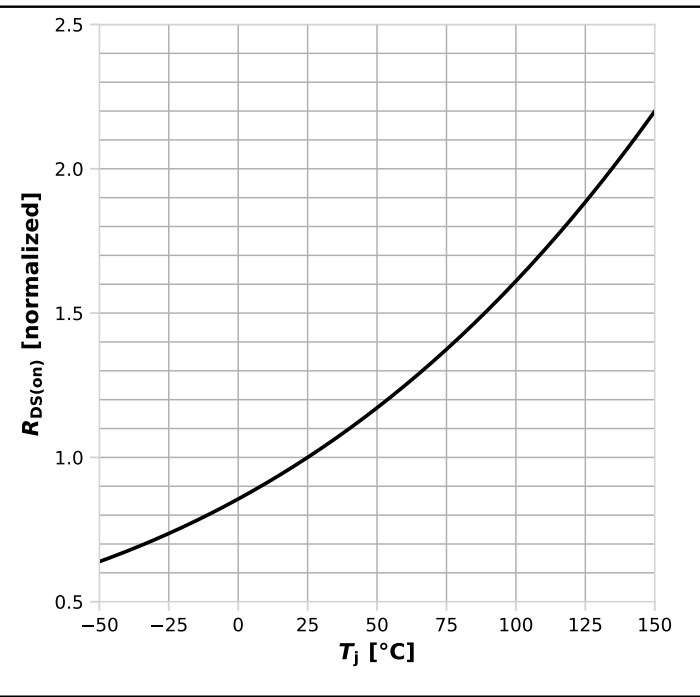
$I_D = f(V_{DS})$; $T_j = 125\text{ °C}$; parameter: V_{GS}

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



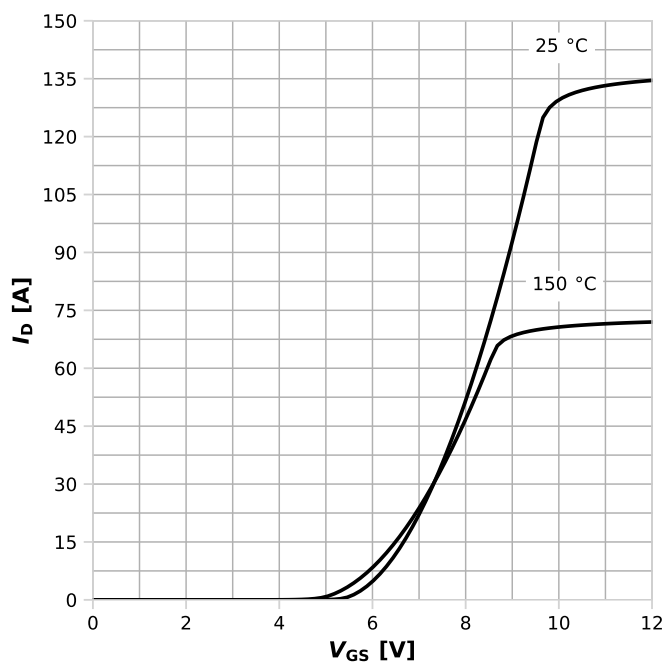
$R_{DS(on)} = f(I_D)$; $T_j = 125\text{ °C}$; parameter: V_{GS}

Diagram 8: Drain-source on-state resistance



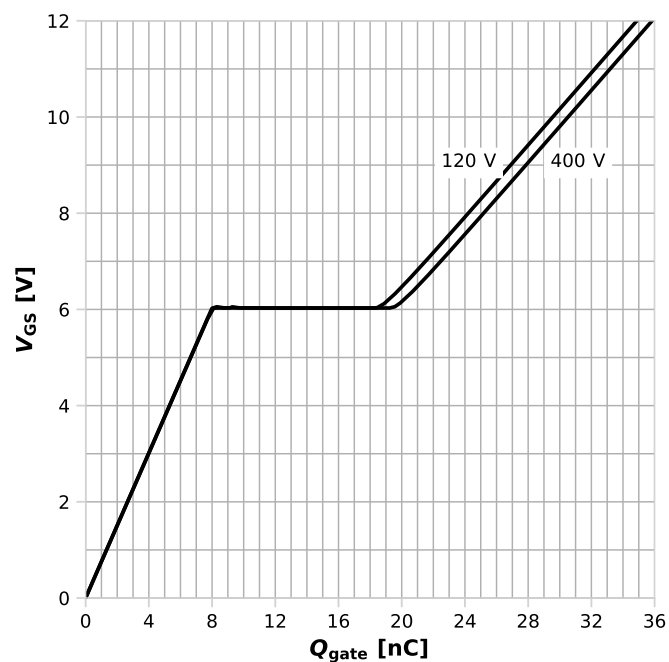
$R_{DS(on)} = f(T_j)$; $I_D = 10.1\text{ A}$; $V_{GS} = 10\text{ V}$

Diagram 9: Typ. transfer characteristics



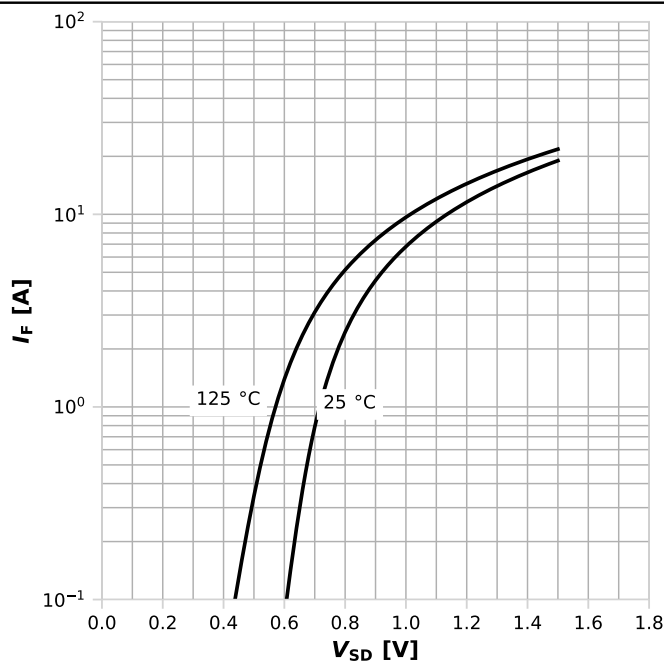
$I_D = f(V_{GS})$; $V_{DS} = 20V$; parameter: T_j

Diagram 10: Typ. gate charge



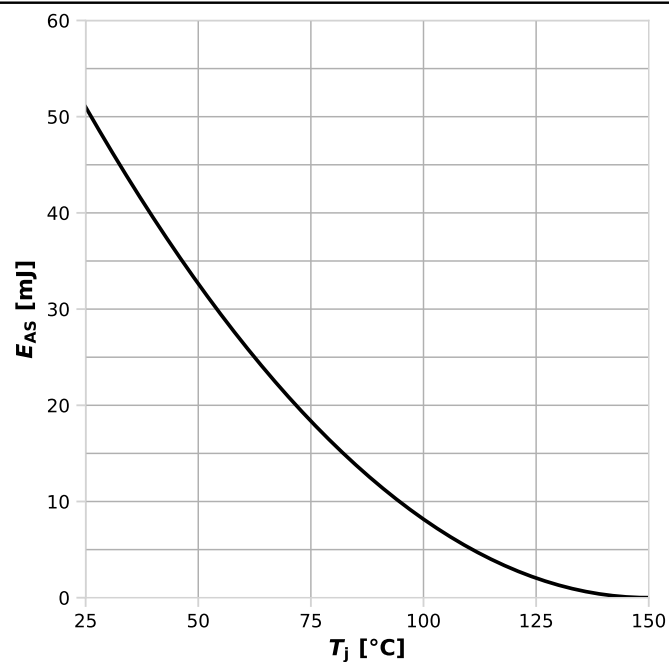
$V_{GS} = f(Q_{gate})$; $I_D = 5.1$ A pulsed; parameter: V_{DD}

Diagram 11: Forward characteristics of reverse diode



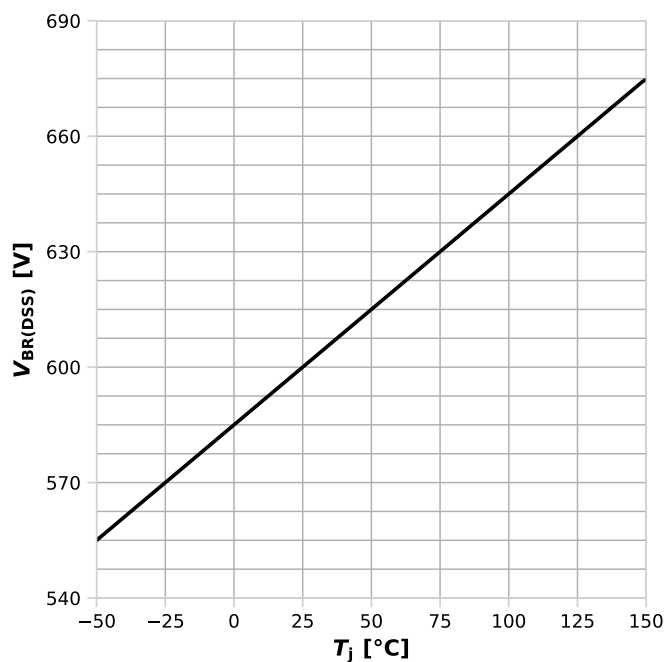
$I_F = f(V_{SD})$; parameter: T_j

Diagram 12: Avalanche energy



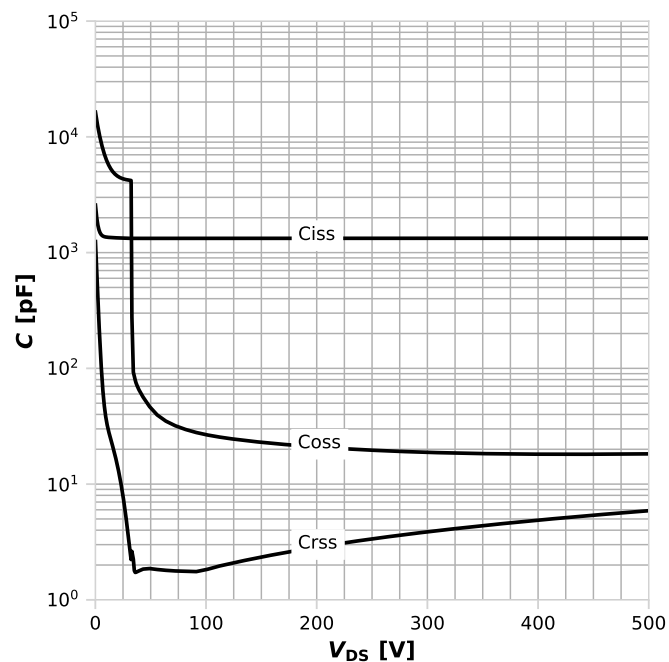
$E_{AS} = f(T_j)$; $I_D = 2.7$ A; $V_{DD} = 50$ V

Diagram 13: Drain-source breakdown voltage



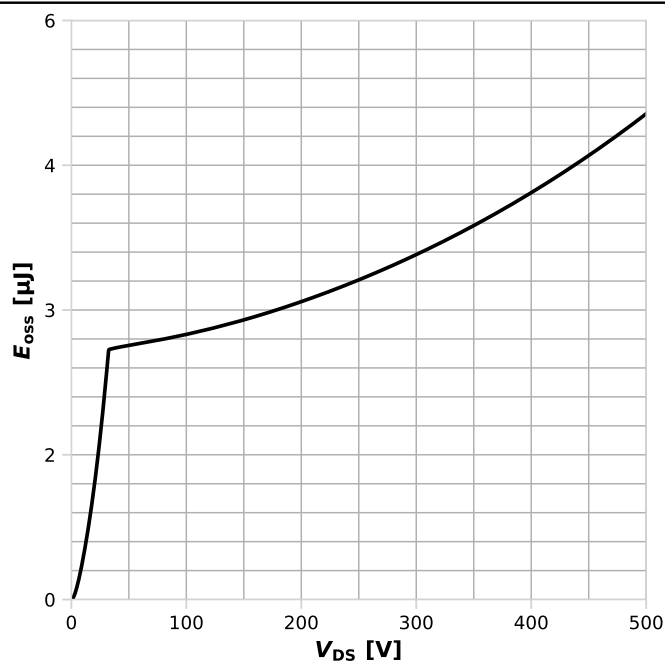
$$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$$

Diagram 14: Typ. capacitances



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

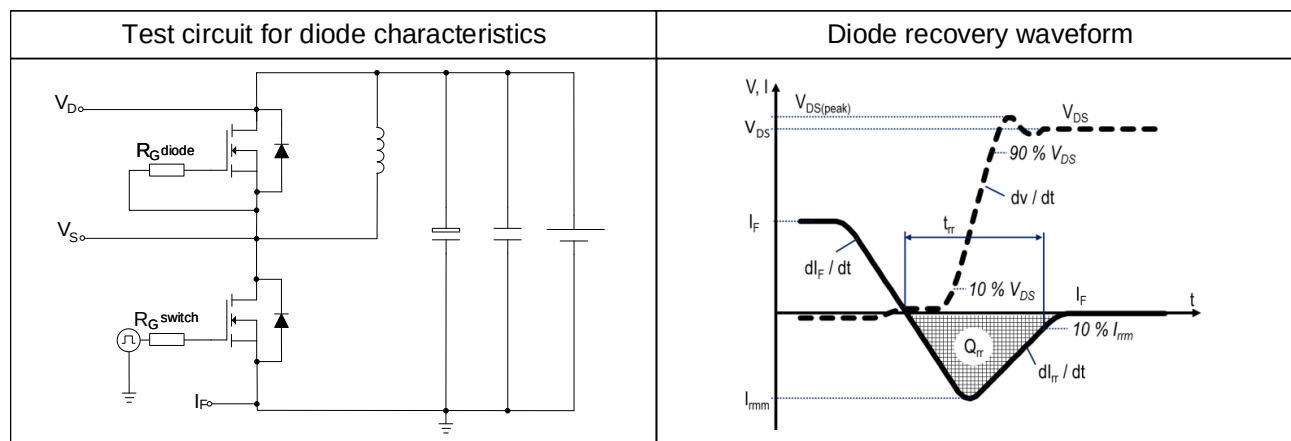
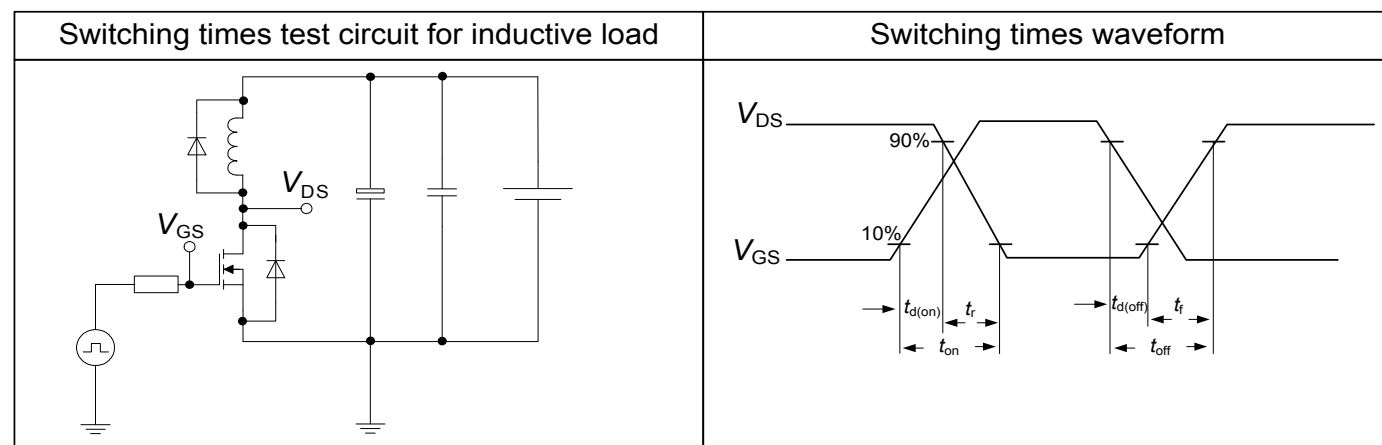
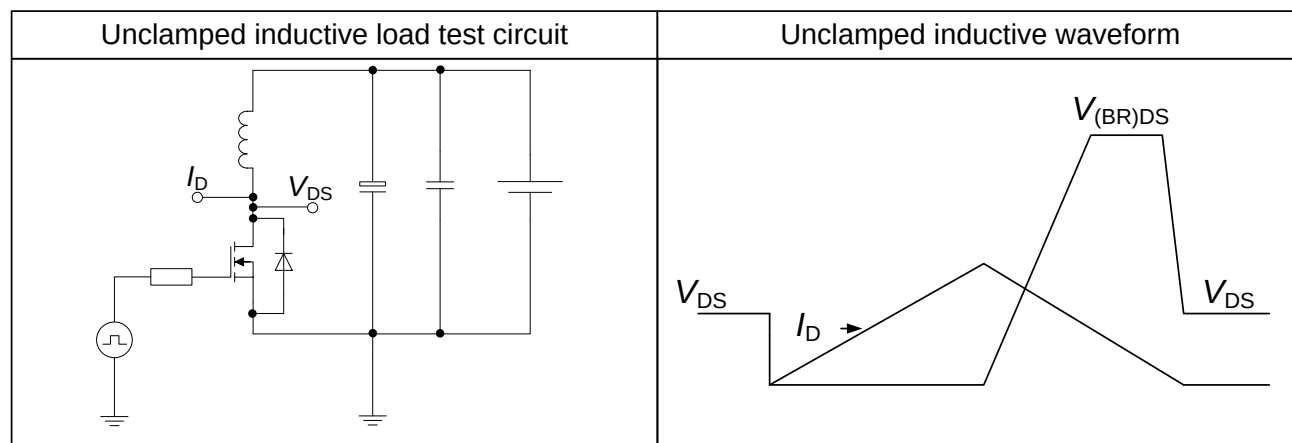
Diagram 15: Typ. Coss stored energy



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

5 Test circuits

Table 8 Diode characteristics

**Table 9 Switching times****Table 10 Unclamped inductive load**

6 Package outlines

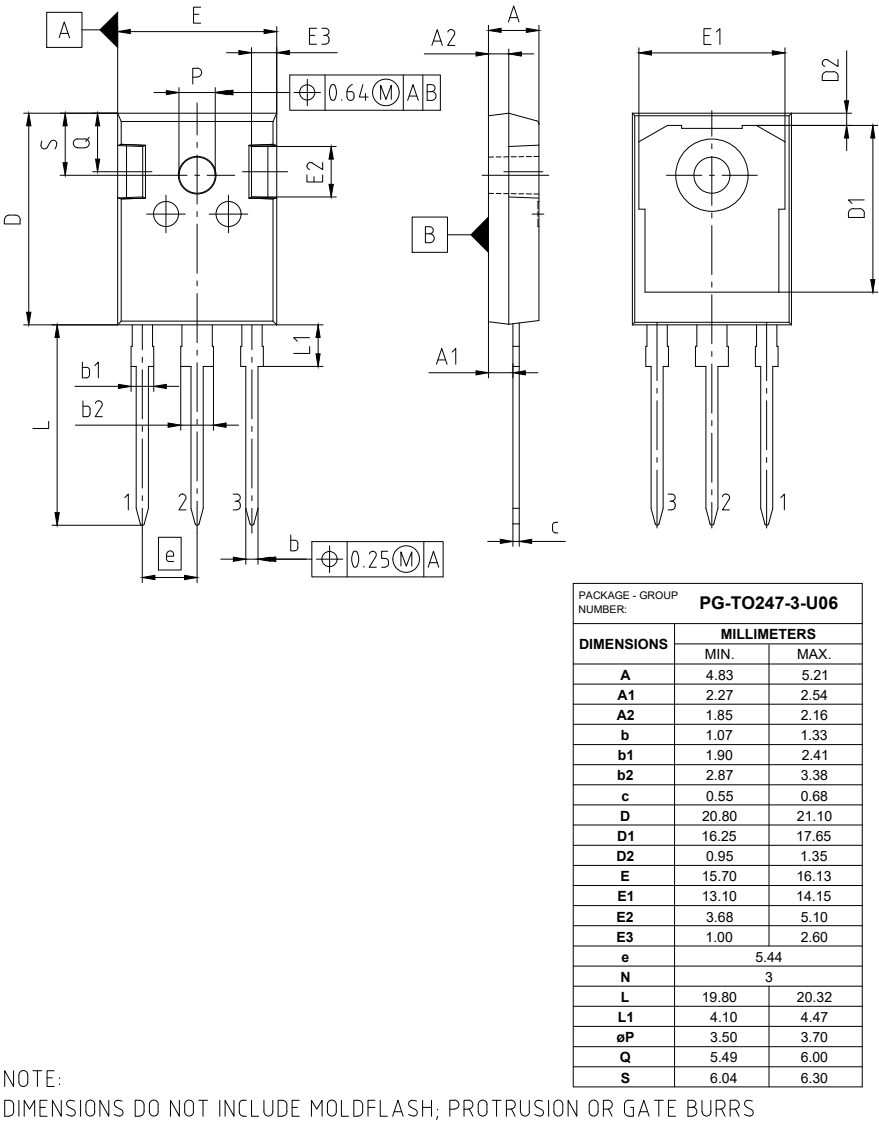


Figure 1 Outline PG-T0247-3, dimensions in mm

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

IPW60R099CM8

Revision 2024-10-30, Rev. 2.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2024-10-30	Change of SOA diagram scaling

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