

IPB720P15LMATMA1 Datasheet

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DiGi Electronics Part Number	IPB720P15LMATMA1-DG
Manufacturer	Infineon Technologies
Manufacturer Product Number	IPB720P15LMATMA1
Description	TRENCH \geq 100V PG-TO263-3
Detailed Description	P-Channel 150 V 4.6A (Ta), 41A (Tc) 3.8W (Ta), 300W (Tc) Surface Mount PG-TO263-3



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Purchase and inquiry

Manufacturer Product Number:

IPB720P15LMATMA1

Series:

OptiMOS™

FET Type:

P-Channel

Drain to Source Voltage (Vdss):

150 V

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

4.5V, 10V

Vgs(th) (Max) @ Id:

2V @ 5.55mA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 175°C (Tj)

Supplier Device Package:

PG-T0263-3

Base Product Number:

IPB720P

Manufacturer:

Infineon Technologies

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

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

4.6A (Ta), 41A (Tc)

Rds On (Max) @ Id, Vgs:

72mOhm @ 37A, 10V

Gate Charge (Qg) (Max) @ Vgs:

224 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

11000 pF @ 75 V

Power Dissipation (Max):

3.8W (Ta), 300W (Tc)

Mounting Type:

Surface Mount

Package / Case:

TO-263-3, D2PAK (2 Leads + Tab), TO-263AB

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

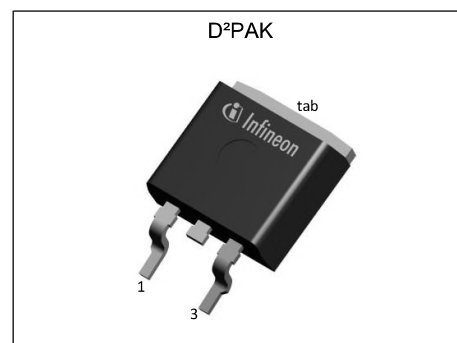
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MOSFET

OptiMOS™ Power-Transistor, -150 V

Features

- P-channel
- Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5\text{ V}$
- 100% avalanche tested
- Logic level
- Enhancement mode
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

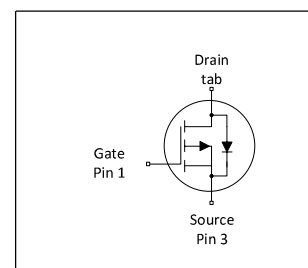


Product validation

Fully qualified according to JEDEC for Industrial Applications

Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	-150	V
$R_{DS(on),max}$	72	$m\Omega$
I_D	-41	A
Q_{oss}	-61	nC
Q_G	-224	nC



Type / Ordering Code	Package	Marking	Related Links
IPB720P15LM	PG-TO263-3	720P15LM	-



OptiMOS™ Power-Transistor, -150 V

IPB720P15LM

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OptiMOS™ Power-Transistor, -150 V

IPB720P15LM

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	-	-	-41 -29 -29 -4.6	A	$V_{GS}=-10\text{ V}$, $T_C=25\text{ °C}$ $V_{GS}=-10\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=-4.5\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=-4.5\text{ V}$, $T_A=25\text{ °C}$, $R_{THJA}=40\text{ °C/W}^2)$
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	-164	A	$T_A=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	2020	mJ	$I_D=-37\text{ A}$, $R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	300 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}	-	-	0.5	°C/W	-
Thermal resistance, junction - ambient, 6 cm ² cooling area	R_{thJA}	-	-	40	°C/W	-
Thermal resistance, junction - ambient, minimal footprint ²⁾	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	$V_{(BR)DSS}$	-150	-	-	V	$V_{GS}=0\text{ V}$, $I_D=-1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	-1	-1.5	-2	V	$V_{DS}=V_{GS}$, $I_D=-5550\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	-0.1 -10	-1 -100	μA	$V_{DS}=-150\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=-150\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	-10	-100	nA	$V_{GS}=-20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	60.1 59.6	72 73	m Ω	$V_{GS}=-10\text{ V}$, $I_D=-37\text{ A}$ $V_{GS}=-4.5\text{ V}$, $I_D=-30\text{ A}$
Gate resistance	R_G	-	5.3	-	Ω	-
Transconductance	g_{fs}	-	89	-	S	$ V_{DS} \geq 2 I_D R_{DS(on)max}$, $I_D=-37\text{ A}$

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance ¹⁾	C_{iss}	-	8400	11000	pF	$V_{GS}=0\text{ V}$, $V_{DS}=-75\text{ V}$, $f=1\text{ MHz}$
Output capacitance ¹⁾	C_{oss}	-	340	440	pF	$V_{GS}=0\text{ V}$, $V_{DS}=-75\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance ¹⁾	C_{riss}	-	63	110	pF	$V_{GS}=0\text{ V}$, $V_{DS}=-75\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	23.93	-	ns	$V_{DD}=-75\text{ V}$, $V_{GS}=-4.5\text{ V}$, $I_D=-37\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Rise time	t_r	-	91.68	-	ns	$V_{DD}=-75\text{ V}$, $V_{GS}=-4.5\text{ V}$, $I_D=-37\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	204.9	-	ns	$V_{DD}=-75\text{ V}$, $V_{GS}=-4.5\text{ V}$, $I_D=-37\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Fall time	t_f	-	128.05	-	ns	$V_{DD}=-75\text{ V}$, $V_{GS}=-4.5\text{ V}$, $I_D=-37\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$

Table 6 Gate charge characteristics²⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	-24	-	nC	$V_{DD}=-75\text{ V}$, $I_D=-37\text{ A}$, $V_{GS}=0\text{ to }-4.5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	-12.6	-	nC	$V_{DD}=-75\text{ V}$, $I_D=-37\text{ A}$, $V_{GS}=0\text{ to }-4.5\text{ V}$
Gate to drain charge ¹⁾	Q_{gd}	-	-52	-78	nC	$V_{DD}=-75\text{ V}$, $I_D=-37\text{ A}$, $V_{GS}=0\text{ to }-4.5\text{ V}$
Switching charge	Q_{sw}	-	-64	-	nC	$V_{DD}=-75\text{ V}$, $I_D=-37\text{ A}$, $V_{GS}=0\text{ to }-4.5\text{ V}$
Gate charge total ¹⁾	Q_g	-	-110	-138	nC	$V_{DD}=-75\text{ V}$, $I_D=-37\text{ A}$, $V_{GS}=0\text{ to }-4.5\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	-2.9	-	V	$V_{DD}=-75\text{ V}$, $I_D=-37\text{ A}$, $V_{GS}=0\text{ to }-4.5\text{ V}$
Gate charge total	Q_g	-	-224	-	nC	$V_{DD}=-75\text{ V}$, $I_D=-37\text{ A}$, $V_{GS}=0\text{ to }-10\text{ V}$
Output charge ¹⁾	Q_{oss}	-	-61	-81	nC	$V_{DS}=-75\text{ V}$, $V_{GS}=0\text{ V}$

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

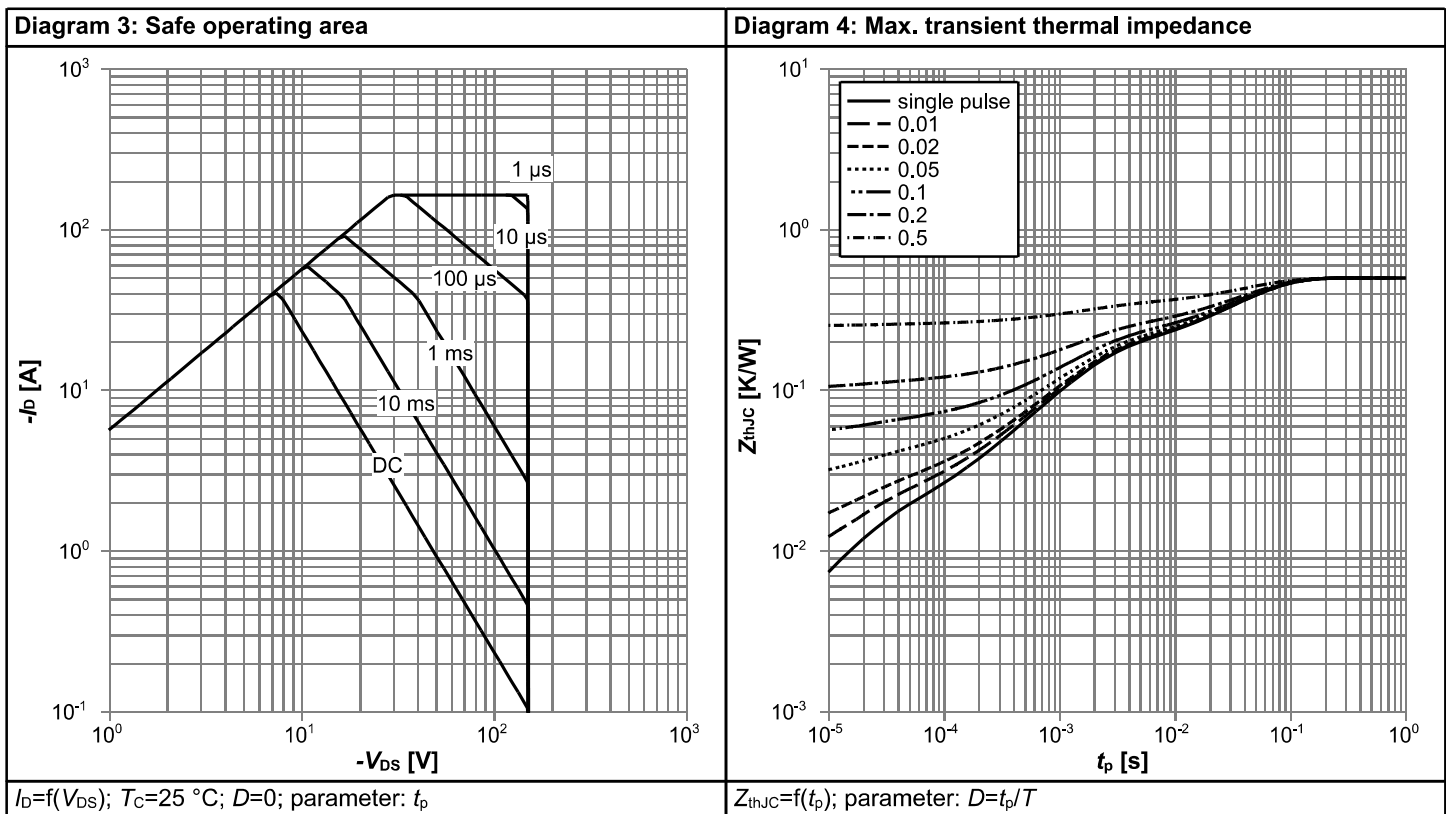
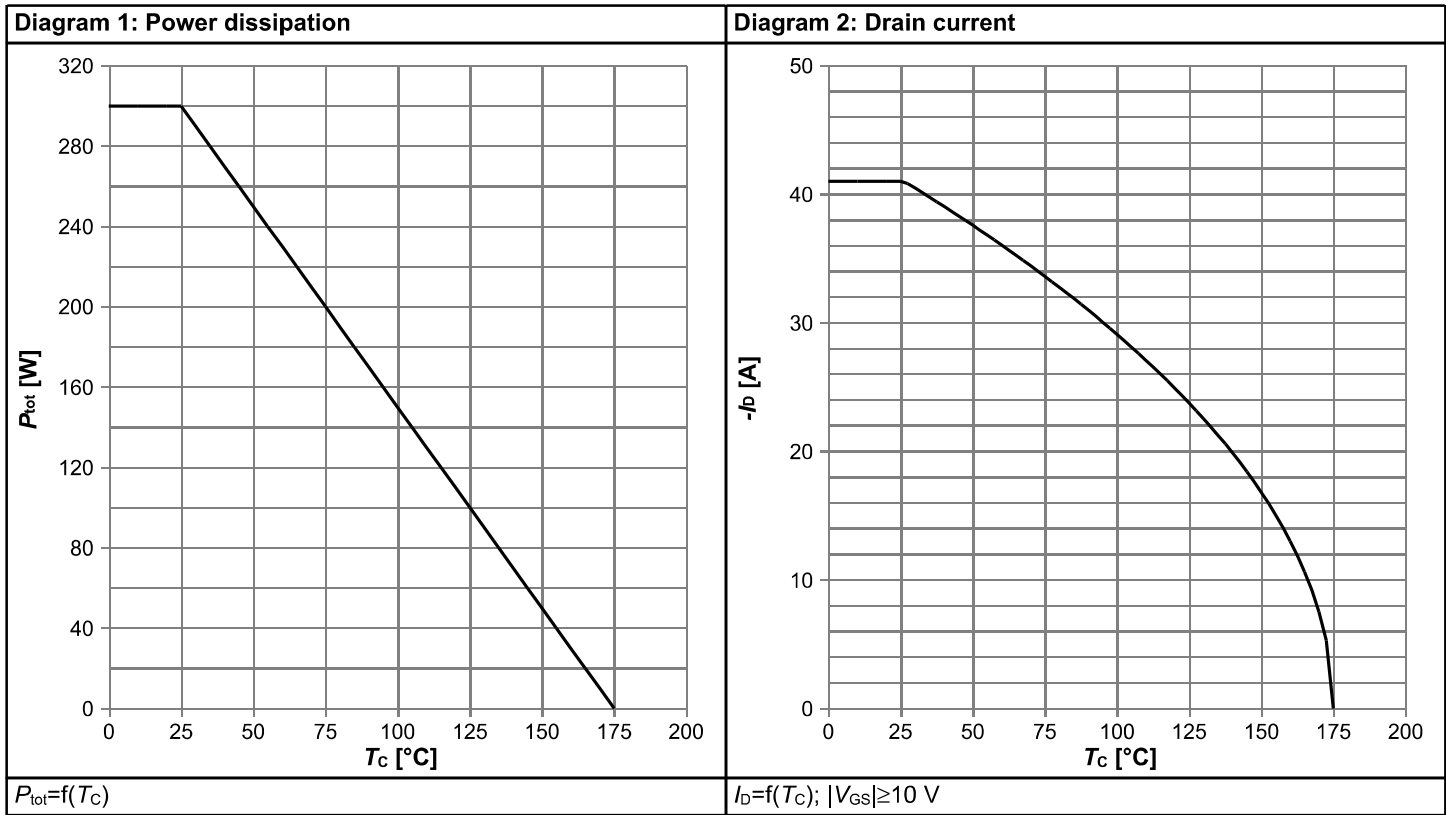
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	-41	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	-164	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	-0.84	-1.2	V	$V_{GS}=0\text{ V}$, $I_F=-37\text{ A}$, $T_j=25\text{ °C}$
Reverse recovery time ¹⁾	t_{rr}	-	118.8	237.6	ns	$V_R=-75\text{ V}$, $I_F=-37\text{ A}$, $di_F/dt=-100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁾	Q_{rr}	-	671.02	1342.0	nC	$V_R=-75\text{ V}$, $I_F=-37\text{ A}$, $di_F/dt=-100\text{ A}/\mu\text{s}$

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



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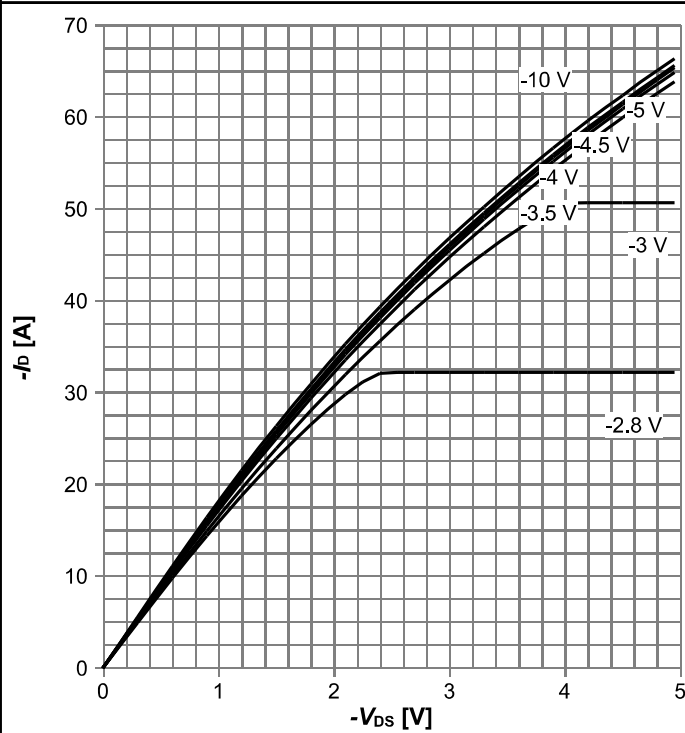
4 Electrical characteristics diagrams





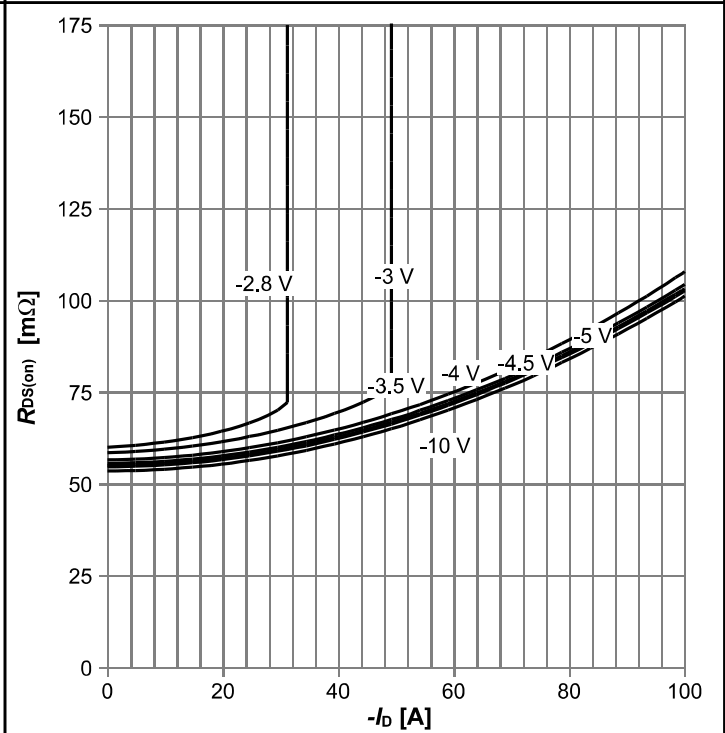
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Diagram 5: Typ. output characteristics



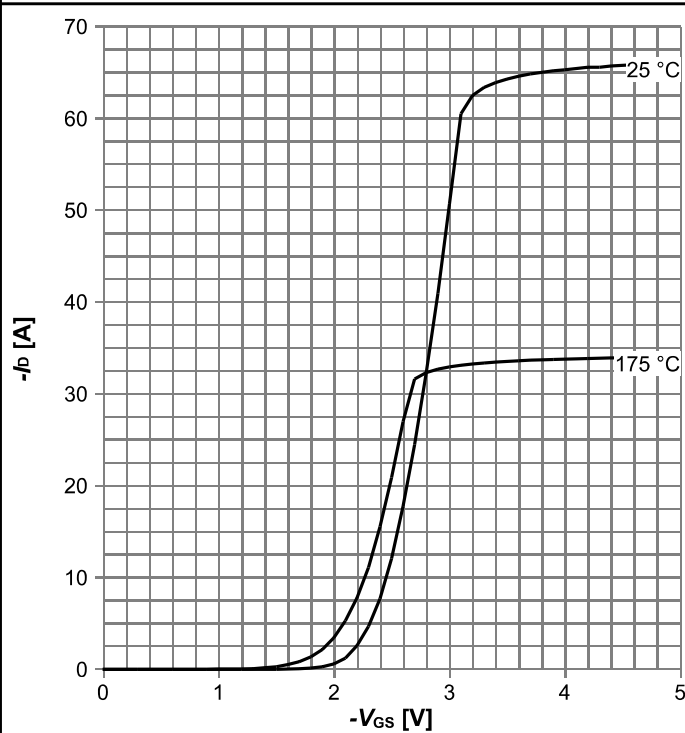
$I_D = f(V_{DS}), T_j = 25\text{ °C};$ parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



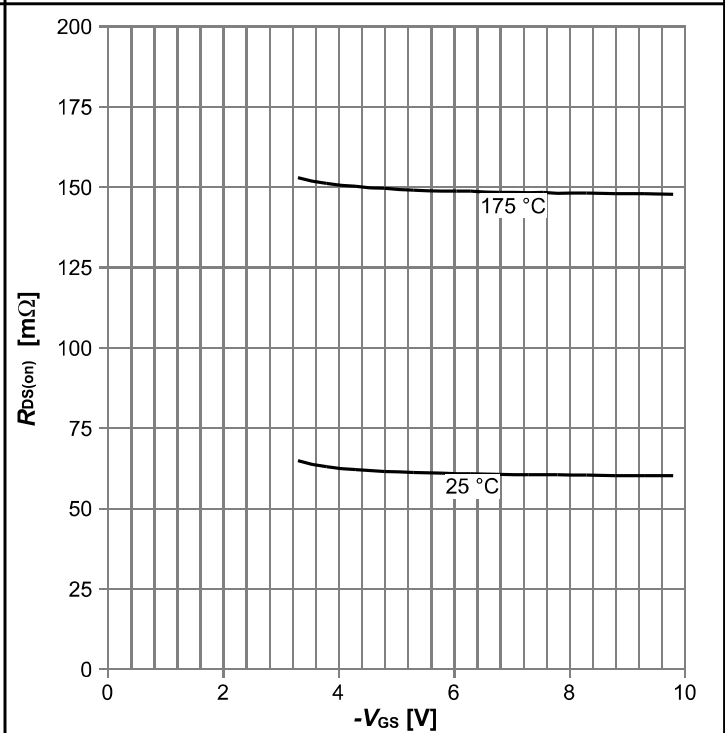
$R_{DS(on)} = f(I_D), T_j = 25\text{ °C};$ parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



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

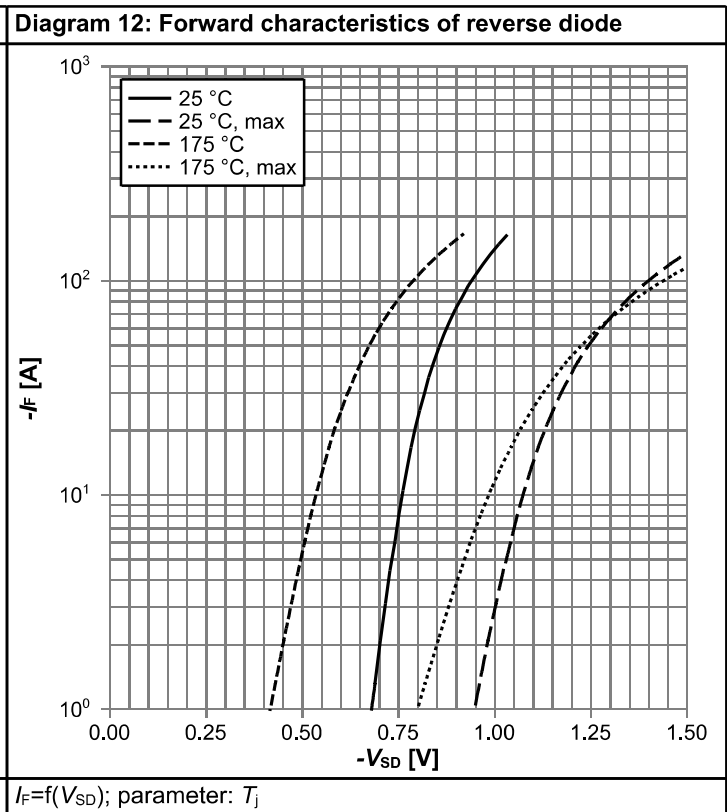
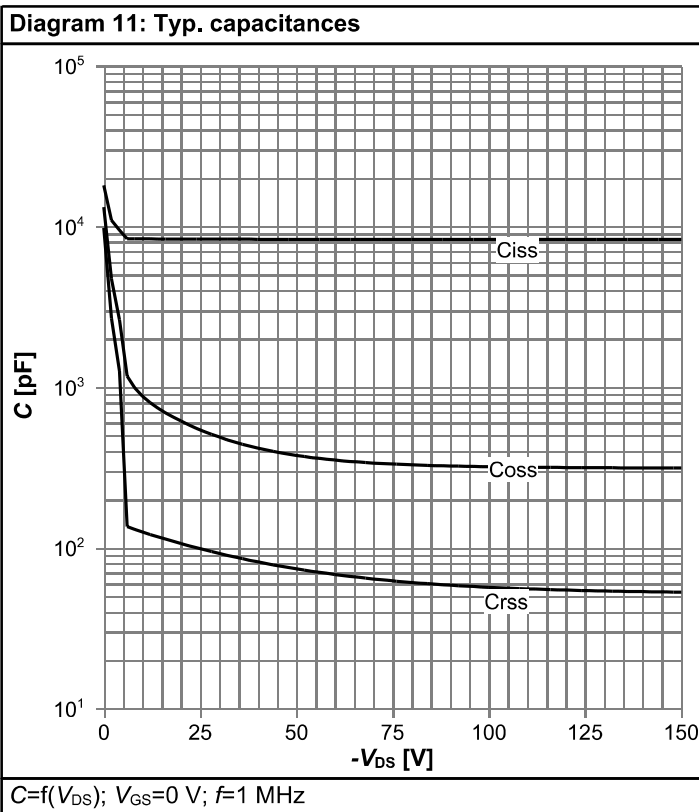
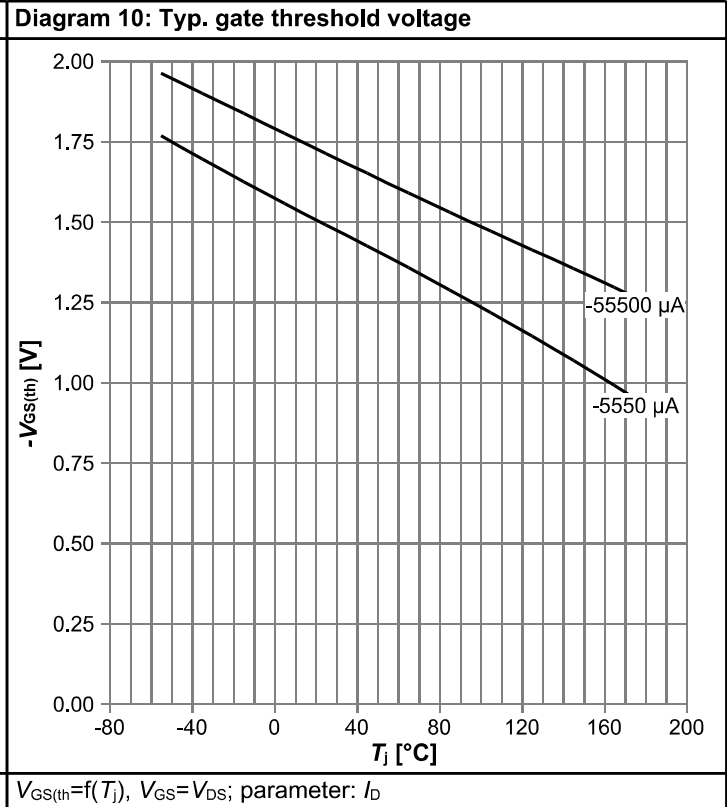
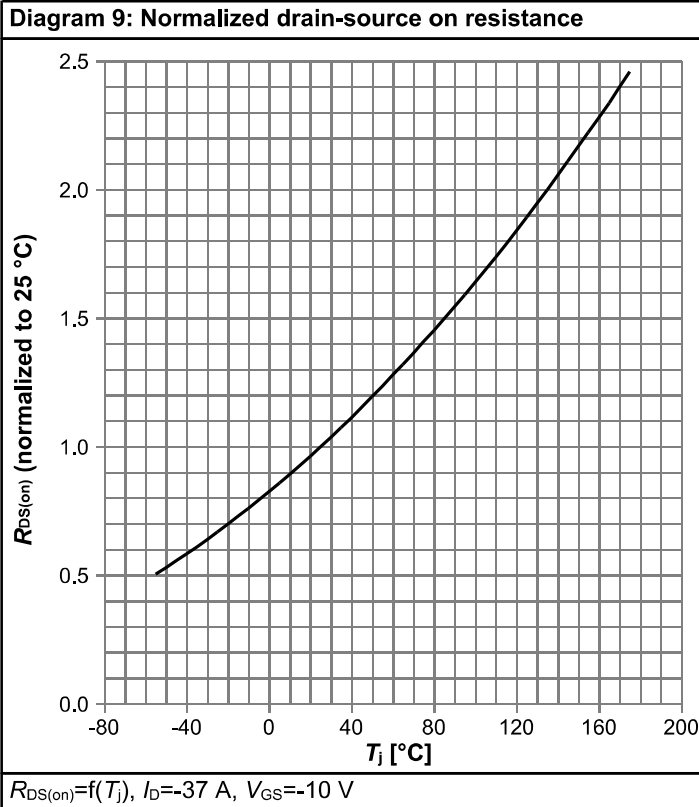
Diagram 8: Typ. drain-source on resistance



$R_{DS(on)} = f(V_{GS}), I_D = -37\text{ A};$ parameter: T_j



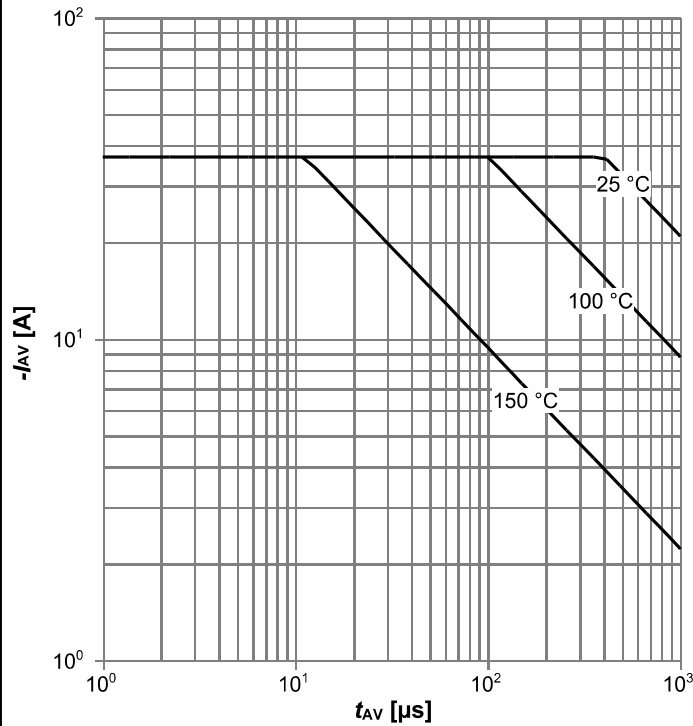
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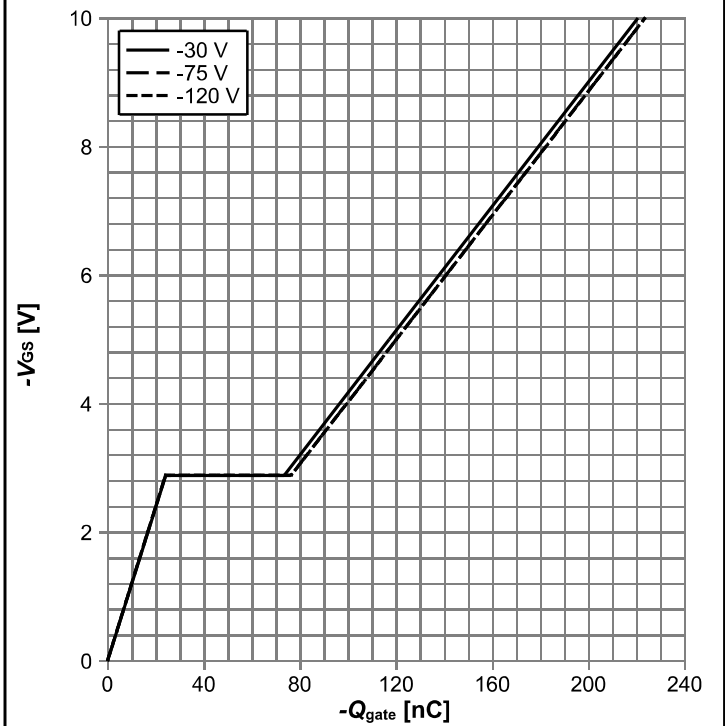
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Diagram 13: Avalanche characteristics



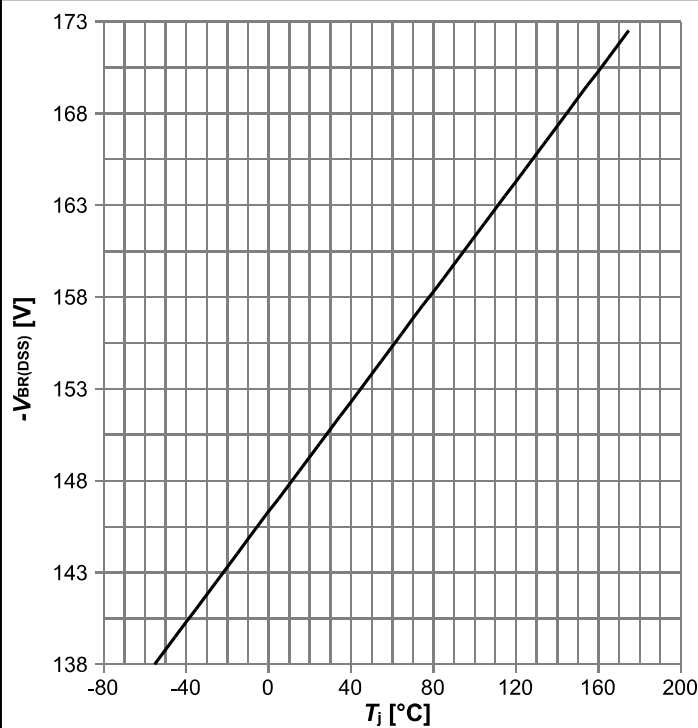
$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



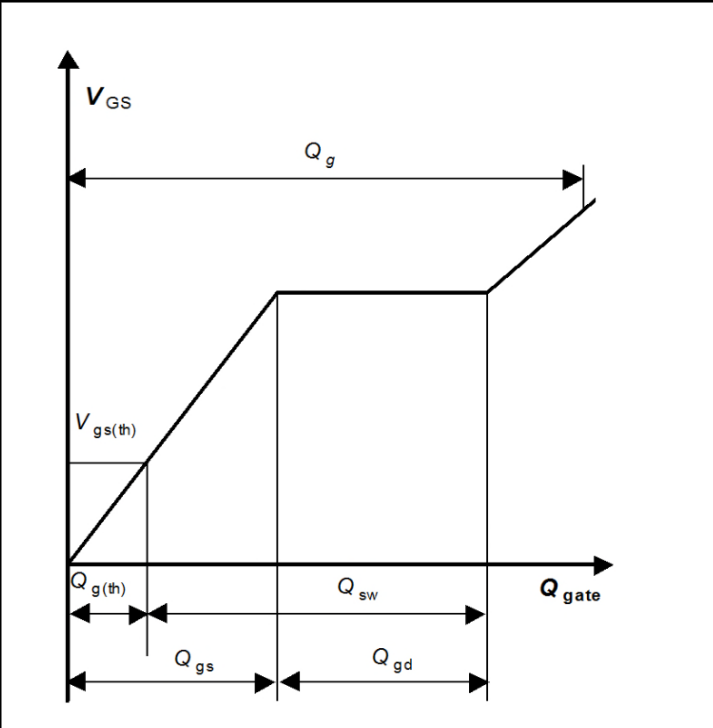
$V_{GS}=f(Q_{gate}), I_D=-37$ A pulsed, $T_j=25$ °C; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage



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

Diagram Gate charge waveforms



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5 Package Outlines

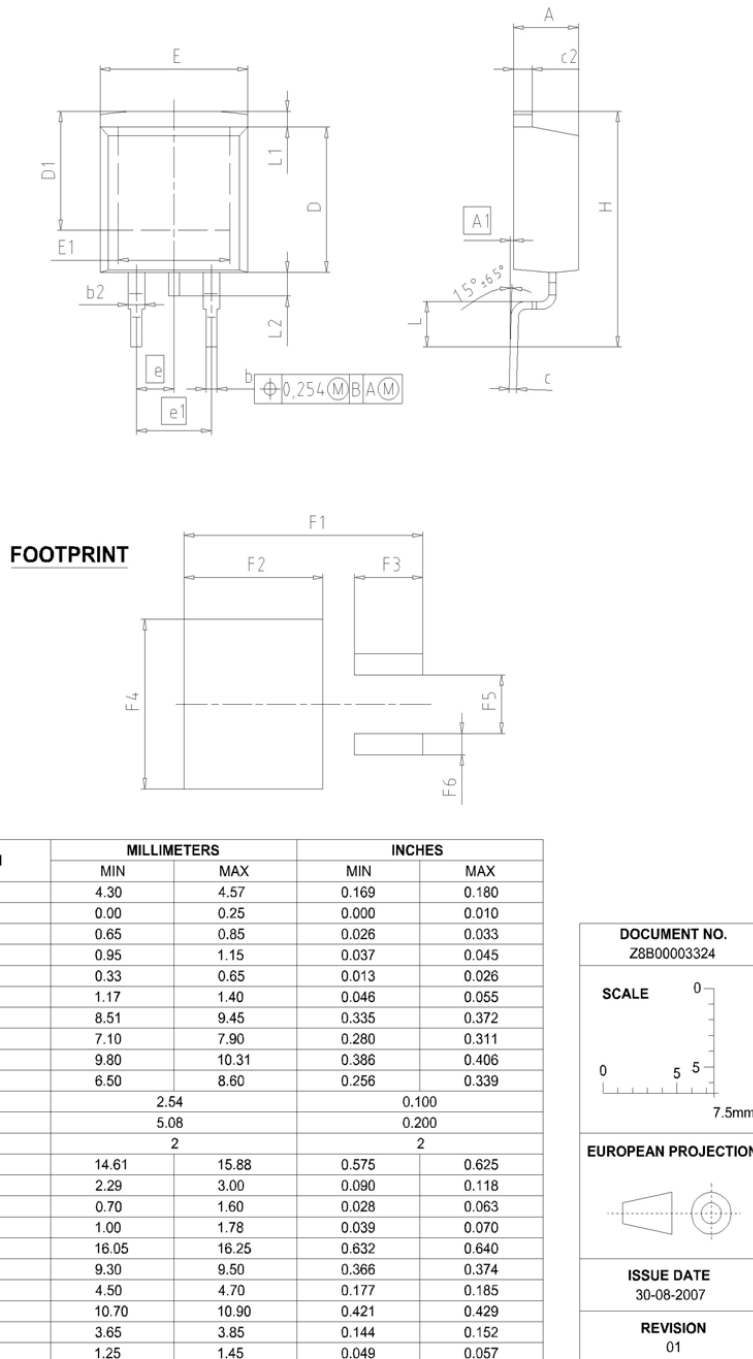


Figure 1 Outline PG-TO263-3, dimensions in mm/inches



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Revision History

IPB720P15LM

Revision: 2021-05-10, Rev. 2.0

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2021-05-10	Release of final version

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