OptiMOS™ Power-MOSFET

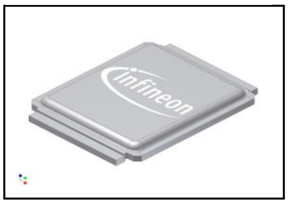
Features

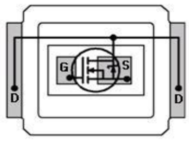
- Optimized for high performance Buck converter
- Low parasitic inductance
- Low profile (<0.7 mm)
- 100% avalanche tested
- 100% R_G Tested
- Double-sided cooling
- Compatible with DirectFET® package SQ footprint and outline [1)]
- Qualified according to JEDEC[2)] for target applications

Product Summary

V_{DS}	25	V
$R_{DS(on),max}$	3.5	mΩ
I_D	69	A
Q_{oss}	13	nC
Q_g(0V..10V)	19	nC

CanPAK™ S
MG-WDSON-2





Type	Package	Outline	Marking
BSF035NE2LQ	MG-WDSON-2	SQ	04E2

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	V_{GS}=10 V, T_C=25 °C	69	A
		V_{GS}=10 V, T_C=100 °C	44	
		V_{GS}=10 V, T_A=25 °C, R_{thJA}=45 K/W[3)]	22	
Pulsed drain current[4)]	$I_{D,pulse}$	T_C=25 °C	276	
Avalanche current, single pulse[5)]	I_{AS}	T_C=25 °C	40	
Avalanche energy, single pulse	E_{AS}	I_D=35 A, R_{GS}=25 Ω	50	mJ
Gate source voltage	V_{GS}		±20	V

[1)] CanPAK™ uses DirectFET ® technology licensed from International Rectifier Corporation. DirectFET® is a registered trademark of International Rectifier Corporation.

[2)] J-STD20 and JESD22

[3)] 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.

[4)] See figure 3 for more detailed information

[5)] See figure 13 for more detailed information

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Power dissipation	P_{tot}	T_C=25 °C	28	W
		T_A=25 °C, R_{thJA}=58 K/W	2.2	
Operating and storage temperature	T_j, T_{stg}		-40 … 150	°C
IEC climatic category; DIN IEC 68-1				

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - case	R_{thJC}	bottom	-	1.0	-	K/W
		top	-	-	4.5	
Device on PCB	R_{thJA}	6 cm^2 cooling area[5)]	-	-	58	

Electrical characteristics, at T_j=25 °C, unless otherwise specified

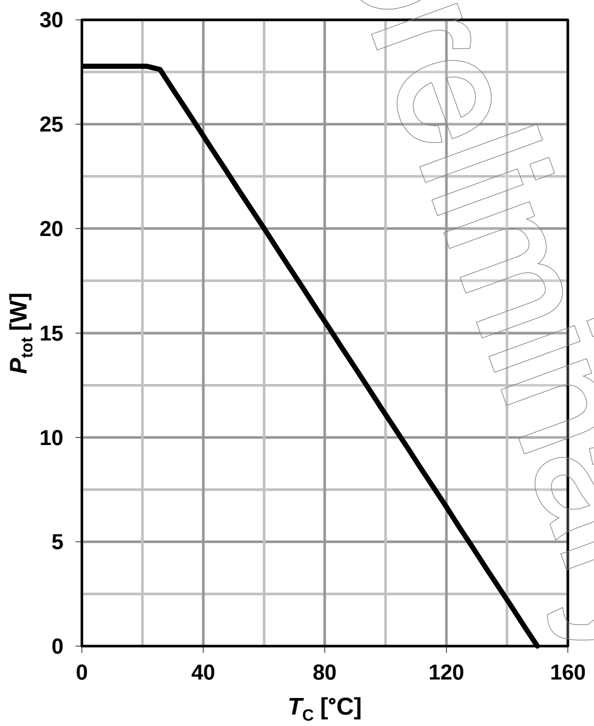
Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=1 mA	25	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250 µA	1.2	-	2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=25 V, V_{GS}=0 V, T_j=25 °C	-	0.1	10	µA
		V_{DS}=25 V, V_{GS}=0 V, T_j=125 °C	-	10	100	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=4.5 V, I_D=30 A	-	3.7	4.6	mΩ
		V_{GS}=10 V, I_D=30 A	-	2.9	3.5	
Gate resistance	R_G		0.3	0.6	1.2	Ω
Transconductance	g_{fs}	$\lvert V_{DS}\rvert$>2$\lvert I_D\rvert R_{DS(on)max}$, I_D=30 A	55	110	-	S

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=12 V, f=1 MHz	-	1400	1862	pF
Output capacitance	C_{oss}		-	630	838	
Reverse transfer capacitance	C_{rss}		-	59	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=12 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω	-	1.8	-	ns
Rise time	t_r		-	3.2	-	
Turn-off delay time	$t_{d(off)}$		-	16	-	
Fall time	t_f		-	2.2	-	
Gate Charge Characteristics[6]						
Gate to source charge	Q_{gs}	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 4.5 V	-	3.1	4.1	nC
Gate charge at threshold	$Q_{g(th)}$		-	2.2	-	
Gate to drain charge	Q_{gd}		-	2.0	3.0	
Switching charge	Q_{sw}		-	3.0	-	
Gate charge total	Q_g		-	9.1	12	
Gate plateau voltage	$V_{plateau}$		-	2.3	-	V
Gate charge total	Q_g	V_{DD}=12 V, I_D=30 A, V_{GS}=0 to 10 V	-	19	25	nC
Gate charge total, sync. FET	$Q_{g(sync)}$	V_{DS}=0.1 V, V_{GS}=0 to 4.5 V	-	7.9	-	
Output charge	Q_{oss}	V_{DD}=12 V, V_{GS}=0 V	-	13	17	
Reverse Diode						
Diode continuous forward current	I_S	T_C=25 °C	-	-	28	A
Diode pulse current	$I_{S,pulse}$		-	-	112	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=30 A, T_j=25 °C	-	0.84	-	V
Reverse recovery charge	Q_{rr}	V_R=15 V, I_F=I_S, di_F/dt=400 A/µs	-	10	-	nC

[6] See figure 16 for gate charge parameter definition

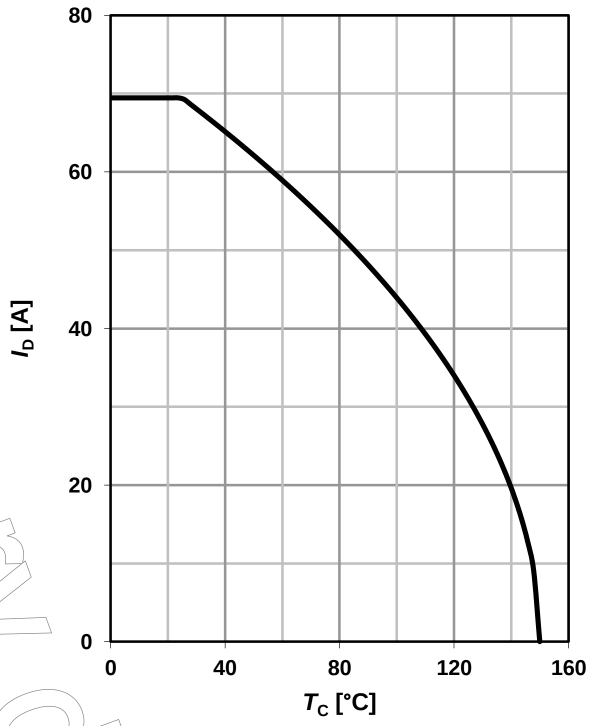
1 Power dissipation

$P_{tot}=f(T_C)$



2 Drain current

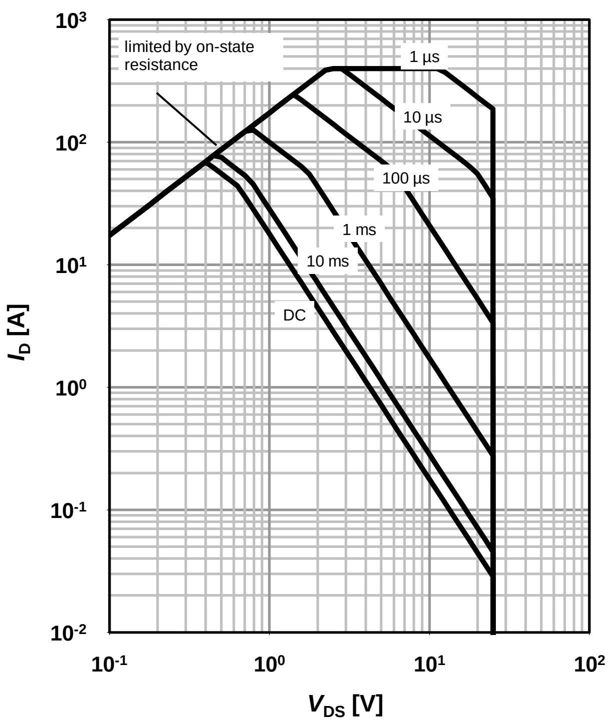
$I_D=f(T_C)$; $V_{GS}\geq10$ V



3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

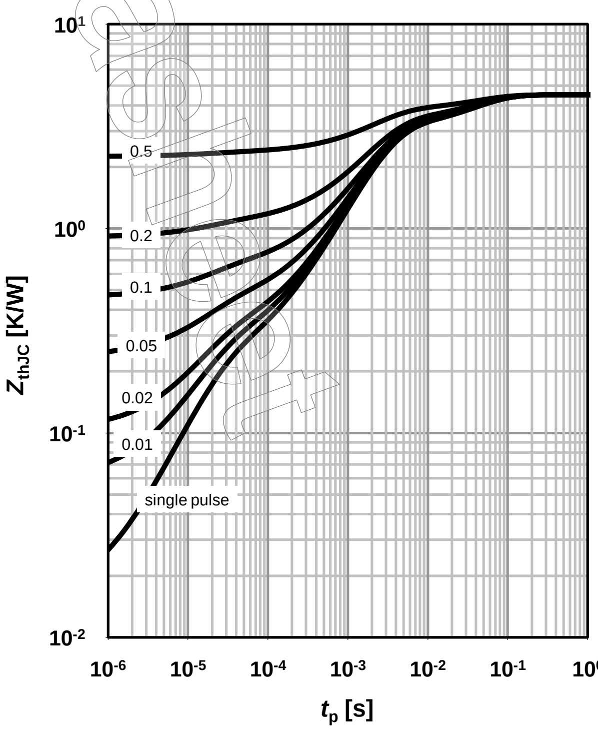
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

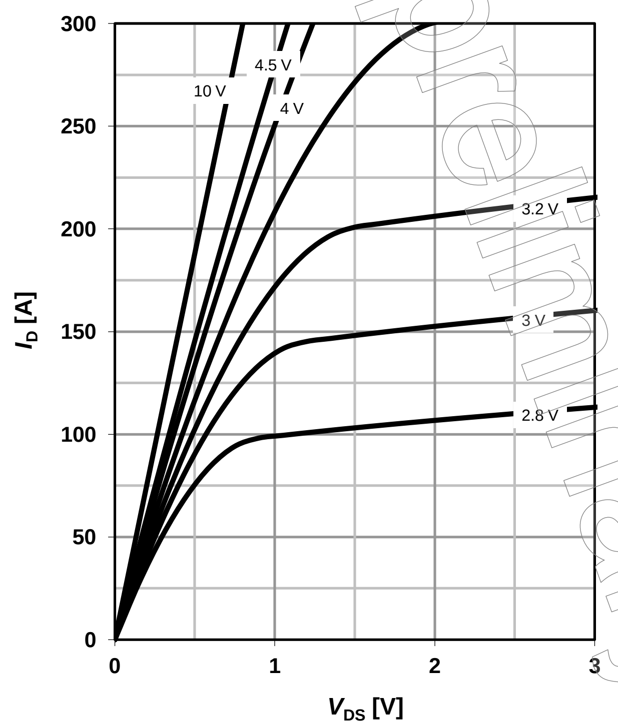
parameter: $D=t_p/T$



5 Typ. output characteristics

$I_D=f(V_{DS})$; $T_j=25$ °C

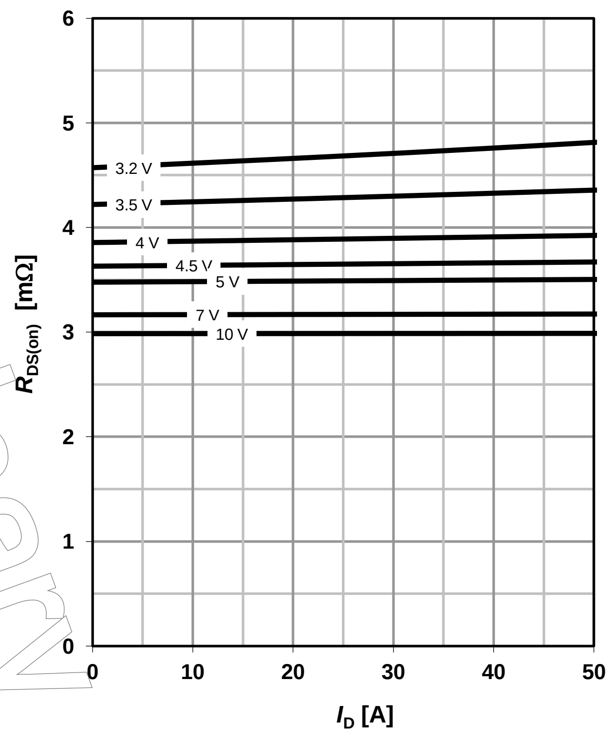
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}=f(I_D)$; $T_j=25$ °C

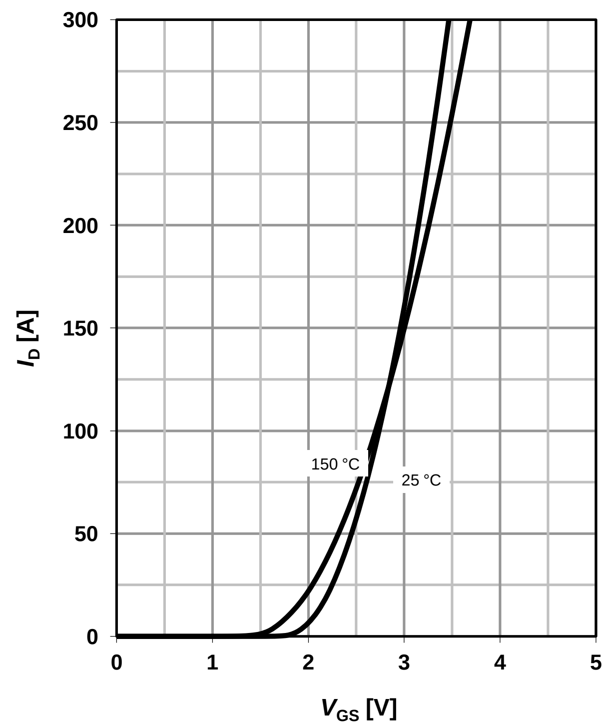
parameter: V_{GS}



7 Typ. transfer characteristics

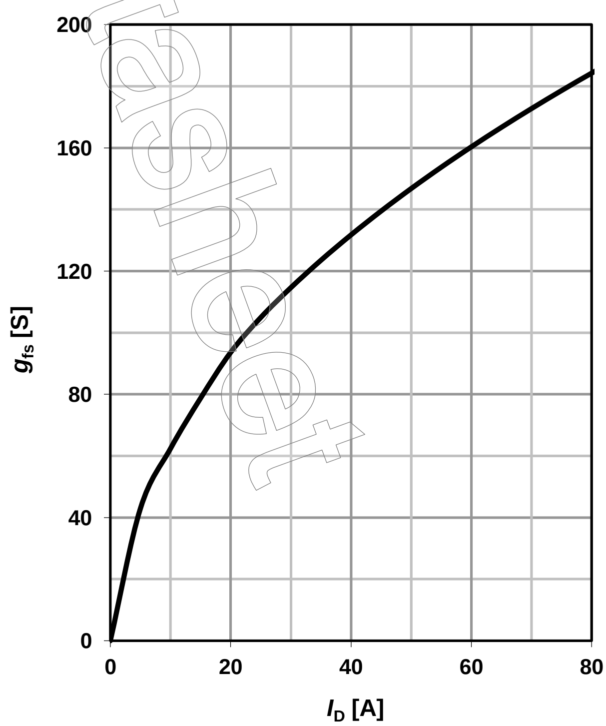
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: T_j



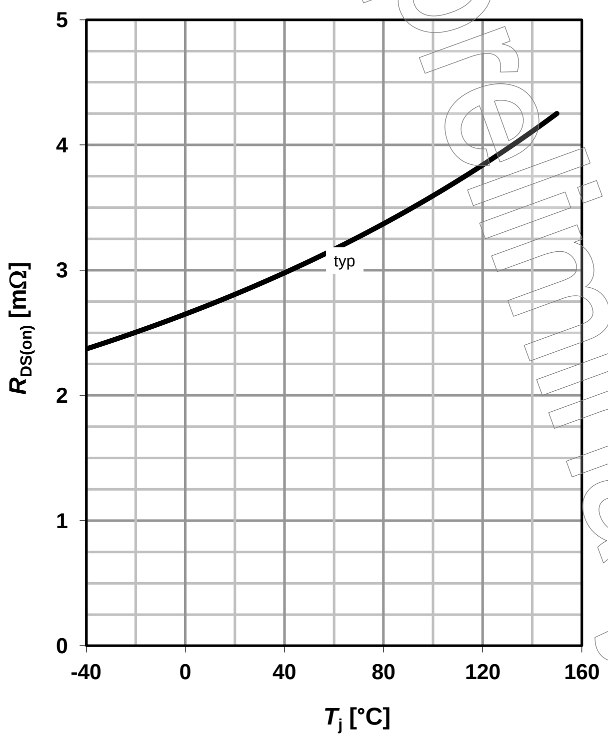
8 Typ. forward transconductance

$g_{fs}=f(I_D)$; $T_j=25$ °C



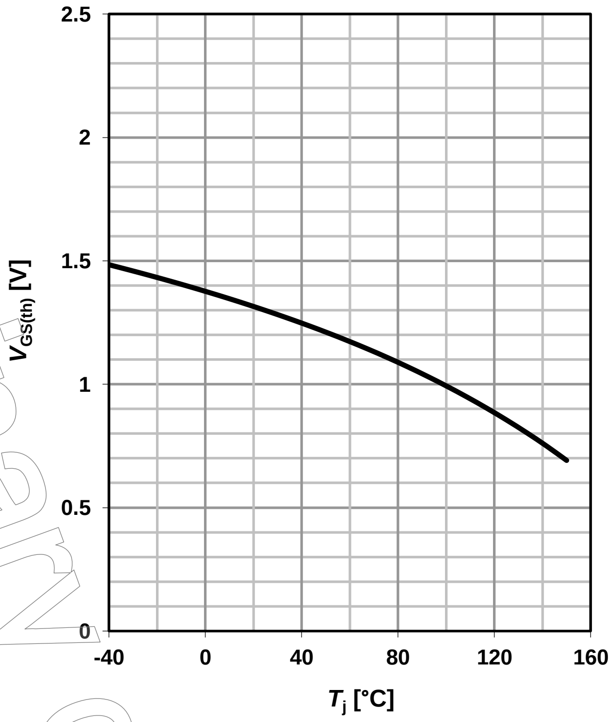
9 Drain-source on-state resistance

$R_{DS(on)}$=f(T_j); I_D=30 A; V_{GS}=10 V



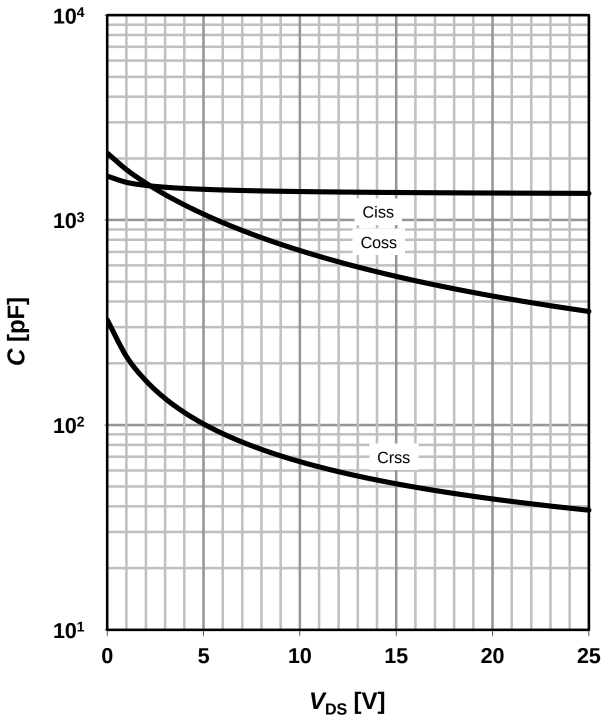
10 Typ. gate threshold voltage

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=250 µA



11 Typ. capacitances

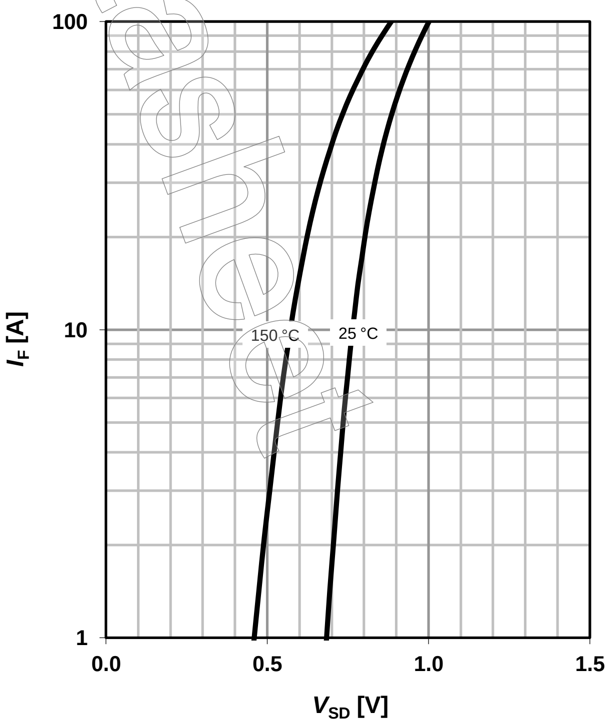
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

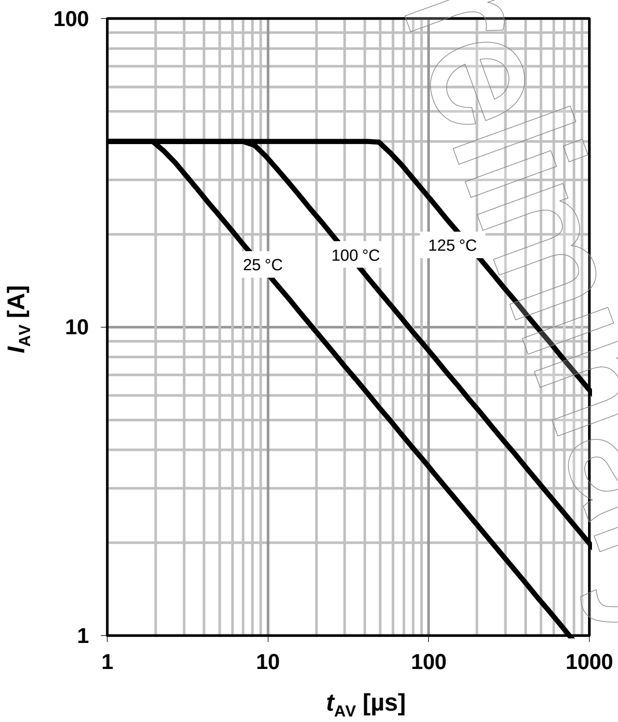
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

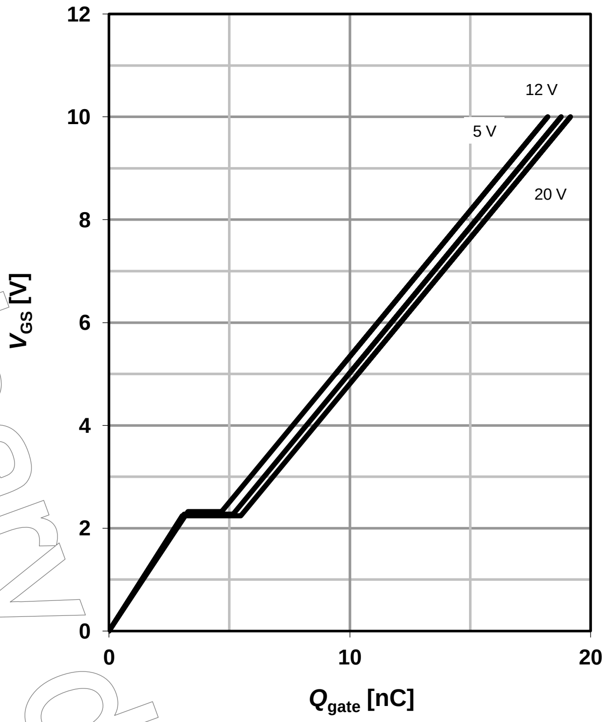
parameter: $T_{j(start)}$



14 Typ. gate charge

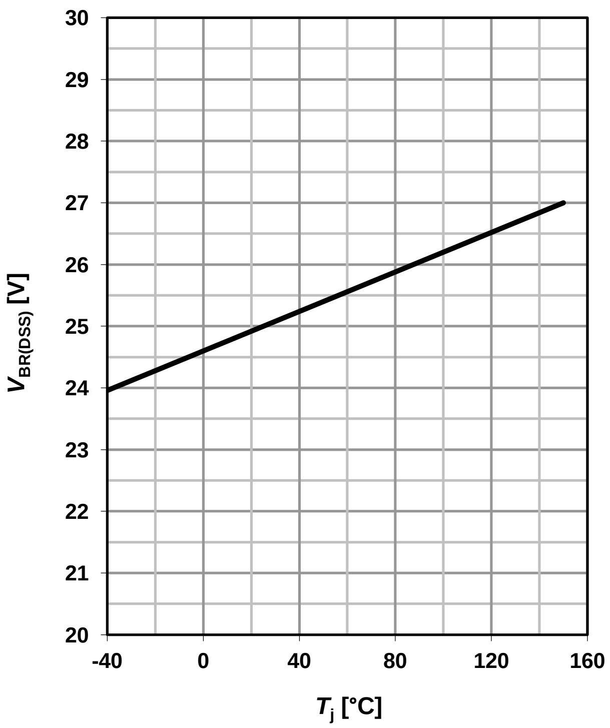
V_{GS}=f(Q_{gate}); I_D=30 A pulsed

parameter: V_{DD}

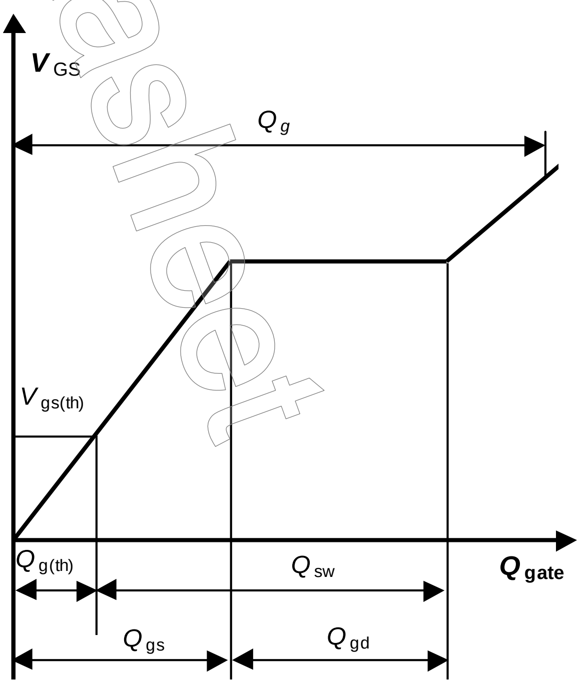


15 Drain-source breakdown voltage

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

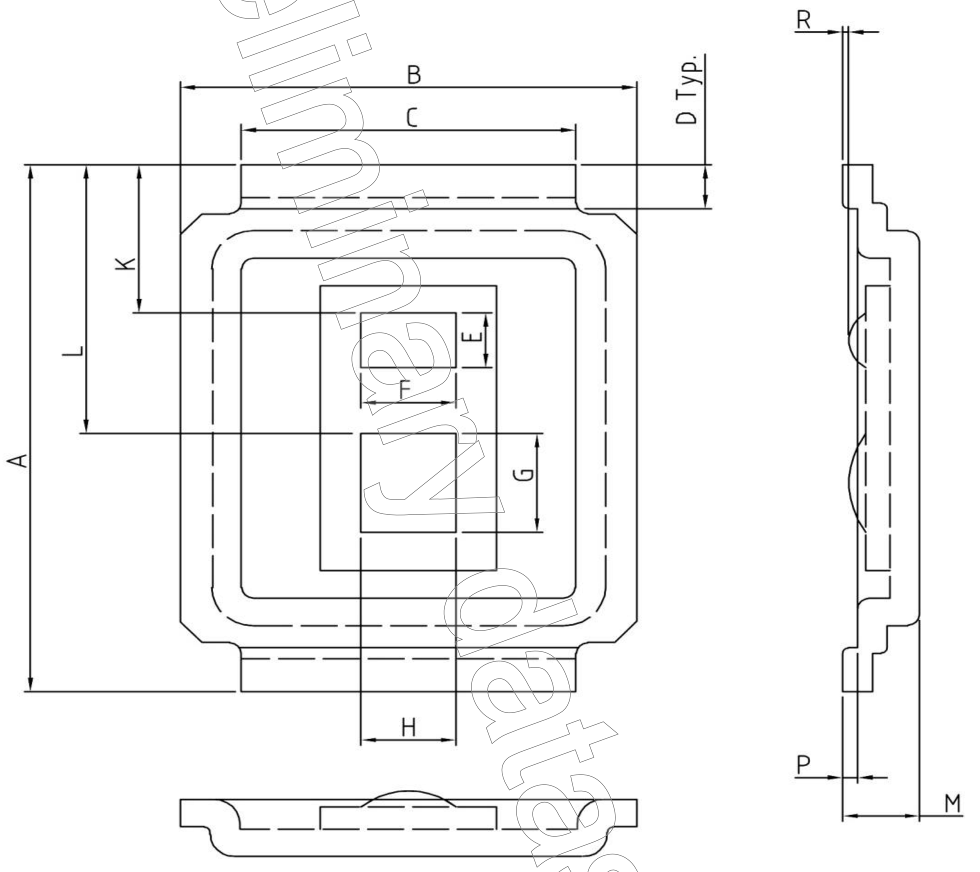


16 Gate charge waveforms



Package Outline

MG-WDSON-2-3/-53



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.75	4.88	0.187	0.192
B	3.70	3.95	0.146	0.156
C	2.75	2.85	0.108	0.112
D	0.35	0.45	0.014	0.018
E	0.48	0.52	0.019	0.020
F	0.78	0.82	0.031	0.032
G	0.88	0.92	0.035	0.036
H	0.78	0.82	0.031	0.032
K	1.25	1.45	0.049	0.057
L	2.35	2.55	0.093	0.100
M	0.60	0.70	0.024	0.028
R	0.00	0.10	0.000	0.004
P	0.08	0.17	0.003	0.007

DOCUMENT NO.
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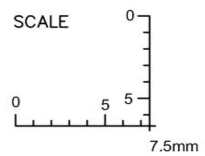
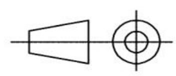
SCALE



EUROPEAN PROJECTION



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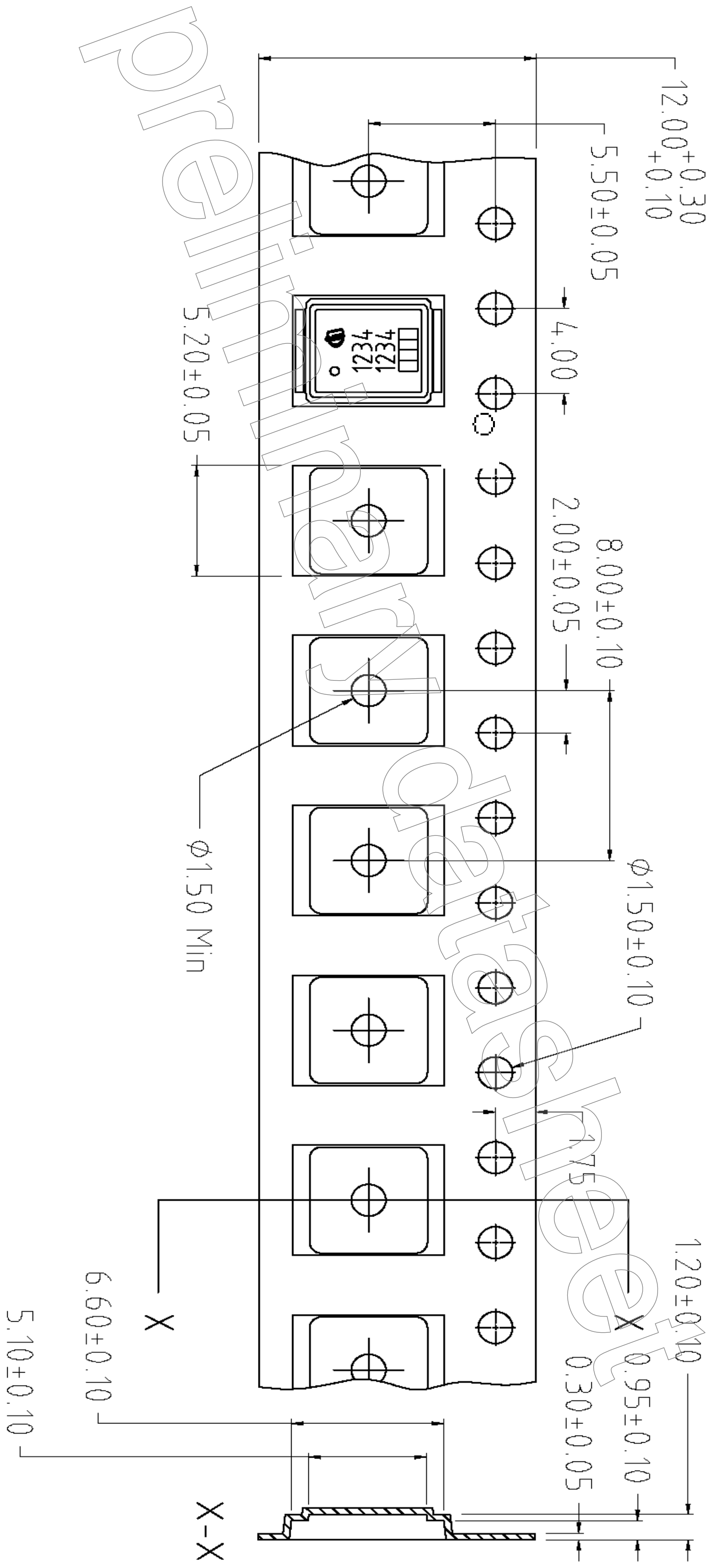
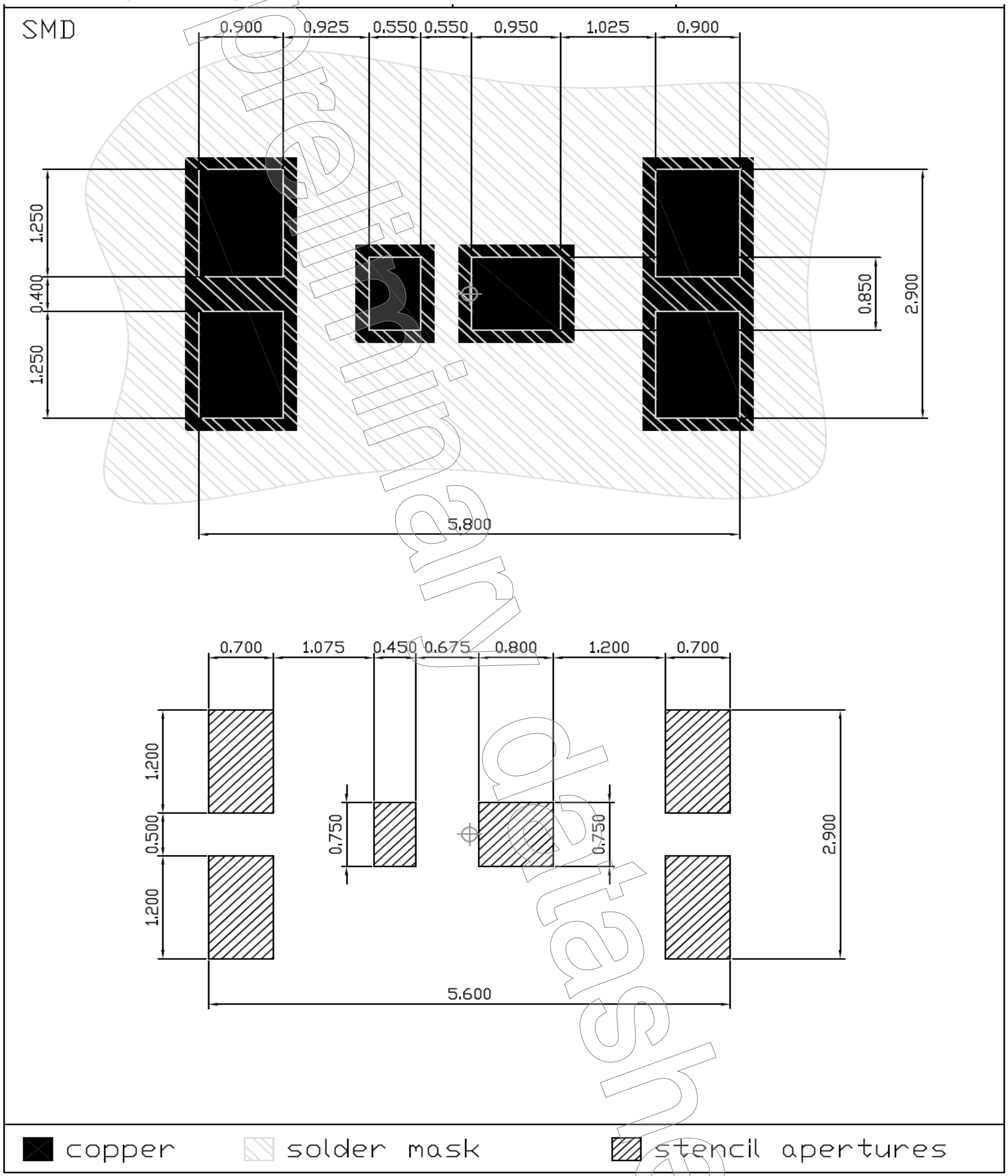
REVISION
02

Package Outline **MG-WDSON-2**



Dimensions in mm

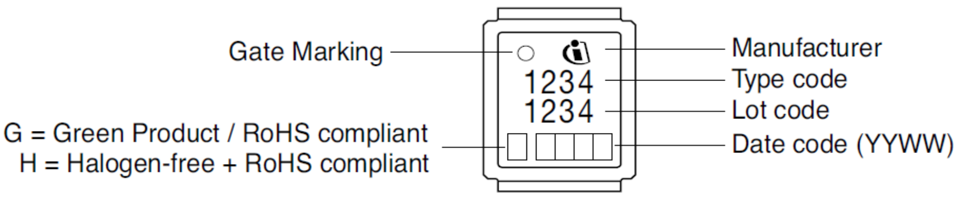
CanPAK SQ: Boardpads & Apertures



Dimensions in mm

Recommended stencil thickness 150 µm

Marking Layout



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