OptiMOS™-5 Power Transistor

AEC Qualified RoHS

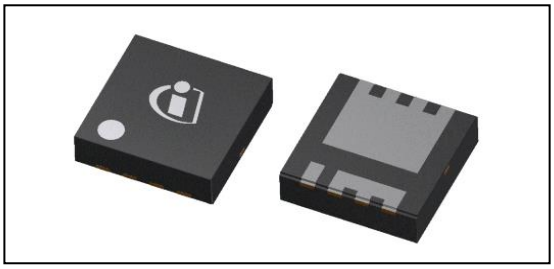
Features

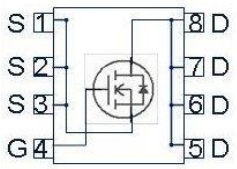
- OptiMOS™ power MOSFET for automotive applications
- N-channel - Enhancement mode - Normal level
- MSL1 up to 260°C peak reflow
- 175 °C operating temperature
- Green product (RoHS compliant)
- 100% Avalanche tested

Product Summary

V_{DS}	60	V
$R_{DS(on),max}$	5	mΩ
I_D	40	A

PG-TSDSON-8-33





Type	Package	Marking
IAUZ40N06S5N050	PG-TSDSON-8-33	5N06050

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

Parameter	Symbol	Conditions	Value	Unit
Drain current	I_D	V_{GS}=10 V, Chip limitation[1,2)]	86	A
		V_{GS}=10V, DC current[3)]	40	
		T_a=85 °C, V_{GS}=10 V, R_{thJA} on 2s2p[2,4)]	14	
Pulsed drain current[2)]	$I_{D,pulse}$	T_C=25 °C, t_p= 100 µs	241	
Avalanche energy, single pulse[2)]	E_{AS}	I_D=20 A	115	mJ
Avalanche current, single pulse	I_{AS}	-	40	A
Gate source voltage	V_{GS}	-	±20	V
Power dissipation	P_{tot}	T_C=25 °C	71	W
Operating and storage temperature	T_j, T_{stg}	-	-55 ... +175	°C

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics[2]						
Thermal resistance, junction - case	R_{thJC}	-	-	-	2.1	K/W
Thermal resistance, junction - ambient[4]	R_{thJA}	-	-	35.5	-	
Electrical characteristics, at T_j=25 °C, unless otherwise specified						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=1mA	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=29µA	2.2	2.8	3.4	
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V, V_{GS}=0V, T_j=25°C	-	-	1	µA
		V_{DS}=60V, V_{GS}=0V, T_j=125°C[1]	-	-	100	
Gate-source leakage current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=7V, I_D=10A	-	5.0	6.0	mΩ
		V_{GS}=10V, I_D=20A	-	4.0	5.0	
Gate resistance[2]	R_G	-	-	1.5	-	Ω

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics[2]						
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=30V, f=1MHz	-	1692	2200	pF
Output capacitance	C_{oss}		-	373	485	
Reverse transfer capacitance	C_{rss}		-	18	26	
Turn-on delay time	$t_{d(on)}$	V_{DD}=30V, V_{GS}=10V, I_D=20A, $R_{G,ext}$=3.5Ω	-	3.8	-	ns
Turn-off delay time	$t_{d(off)}$		-	8.9	-	
Rise time	t_r		-	1.0	-	
Fall time	t_f		-	4.6	-	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=30V, I_D=20A, V_{GS}=0 to 10V	-	7.7	10.0	nC
Gate to drain charge	Q_{gd}		-	4.4	6.6	
Gate charge total	Q_g		-	23.5	30.5	
Gate plateau voltage	$V_{plateau}$		-	4.5	-	V
Reverse Diode						
Diode continous forward current[2]	I_S	T_C=25°C	-	-	40	A
Diode pulse current[2]	$I_{S,pulse}$	T_C=25 °C, t_p= 100 µs	-	-	241	
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=20A, T_j=25°C	-	0.8	1.1	V
Reverse recovery time[2]	t_{rr}	V_R=30V, I_F=40A, di_F/dt=100A/µs	-	30	-	ns
Reverse recovery charge[2]	Q_{rr}		-	22	-	nC

[1] Practically the current is limited by the overall system design including the customer-specific PCB.

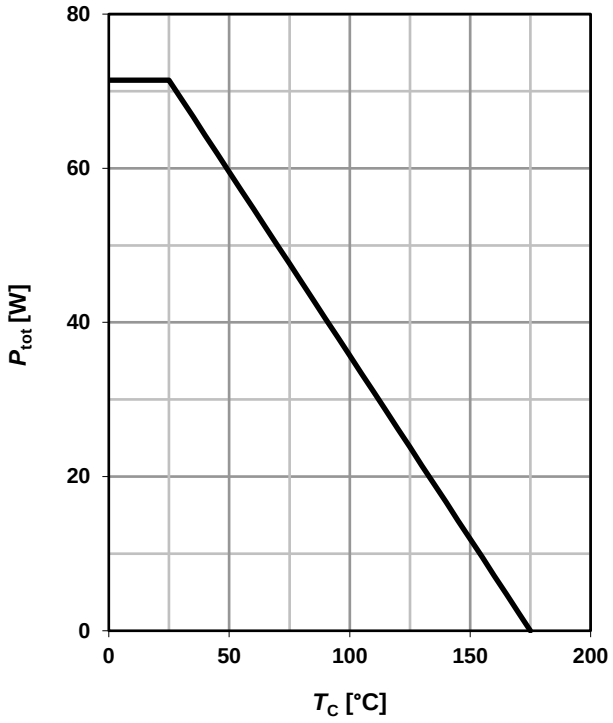
[2] The parameter is not subject to production test - verified by design/characterization.

[3] The product can operate at a specified current based on best practice to minimze electromigration at the solder joint. For rare events and inrush currents, the value may be exceeded.

[4] Device on a four-layer 2s2p FR4 PCB defined in accordance with JEDEC standards (JESD51-5-7). PCB is vertical in still air.

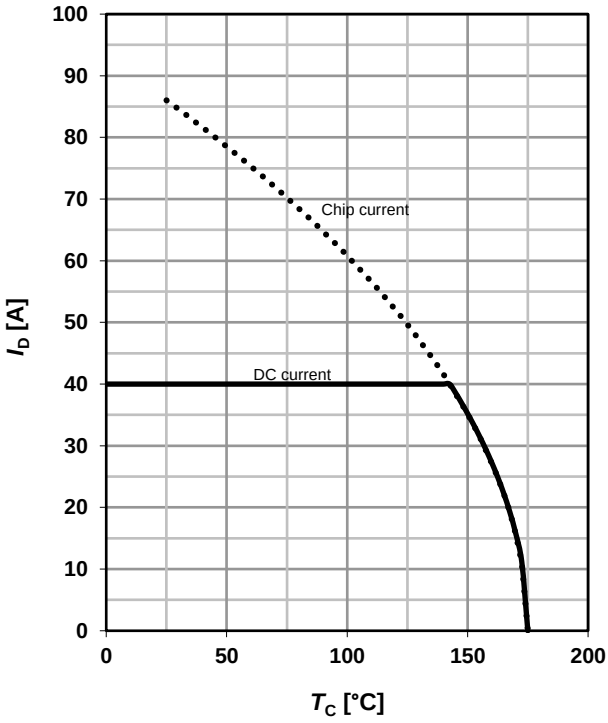
1 Power dissipation

$P_{tot} = f(T_C)$; $V_{GS} = 10$ V



2 Drain current

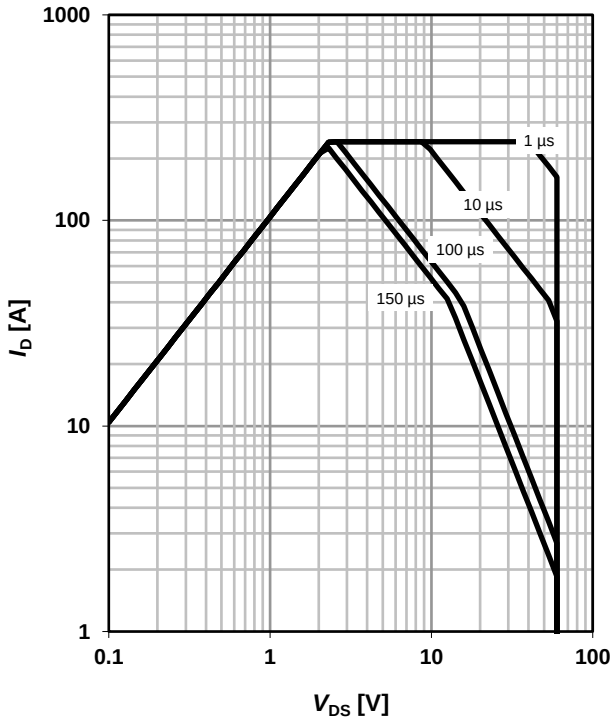
$I_D = f(T_C)$; $V_{GS} = 10$ V



3 Safe operating area

$I_D = f(V_{DS})$; $T_C = 25$ °C; $D = 0$

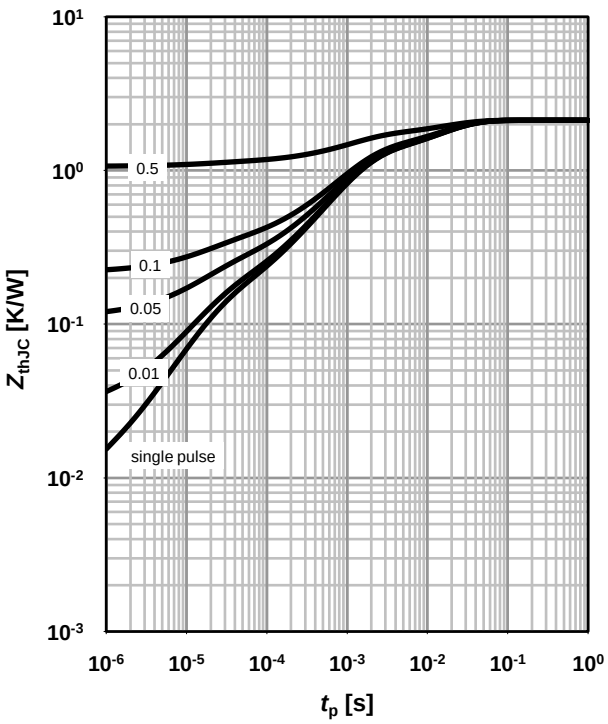
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

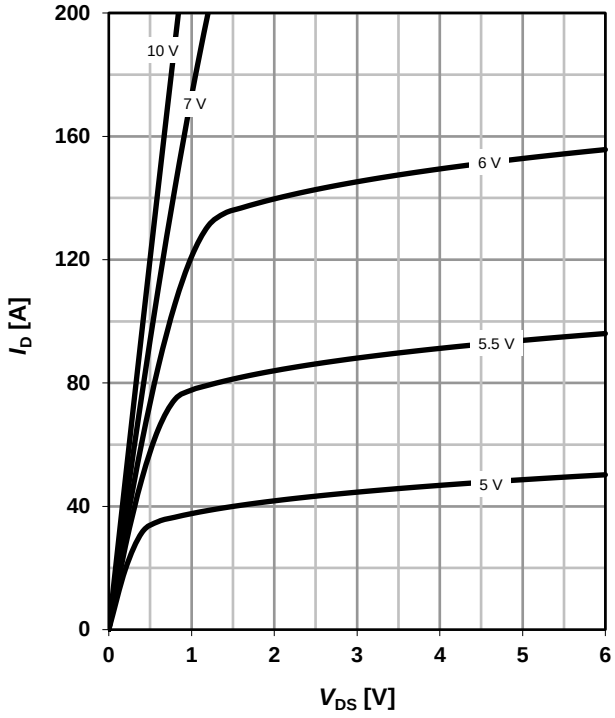
parameter: $D = t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25$ °C

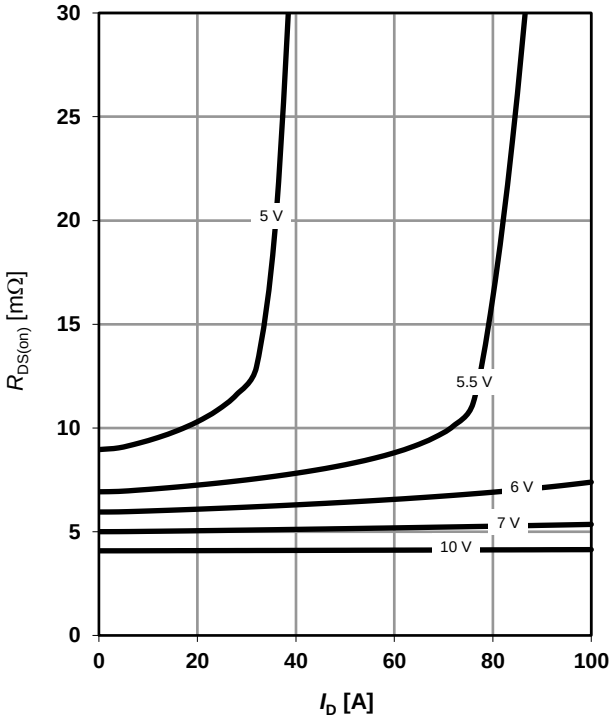
parameter: V_{GS}



6 Typ. drain-source on-state resistance

$R_{DS(on)} = f(I_D)$; $T_j = 25$ °C

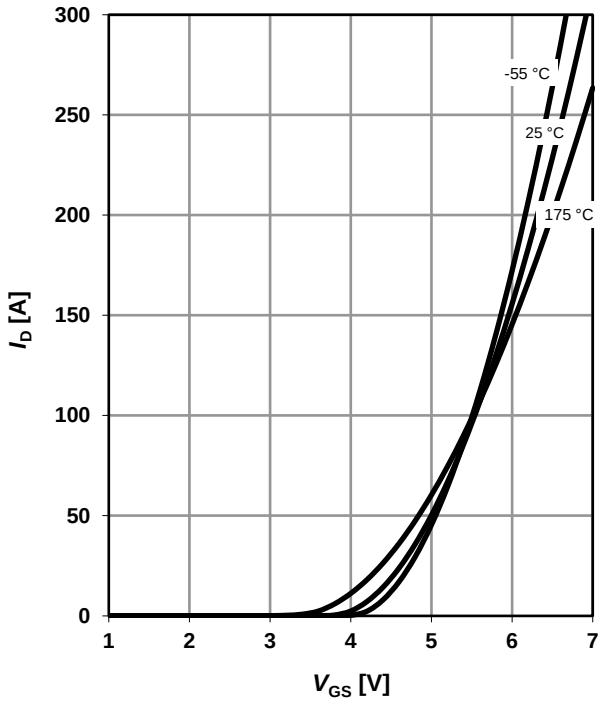
parameter: V_{GS}



7 Typ. transfer characteristics

$I_D = f(V_{GS})$; $V_{DS} = 6$V

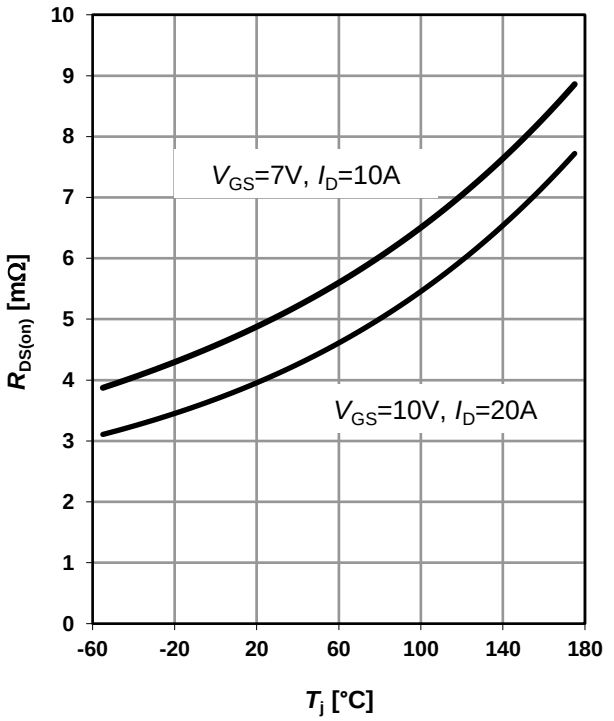
parameter: T_j



8 Typ. drain-source on-state resistance

$R_{DS(on)} = f(T_j)$;

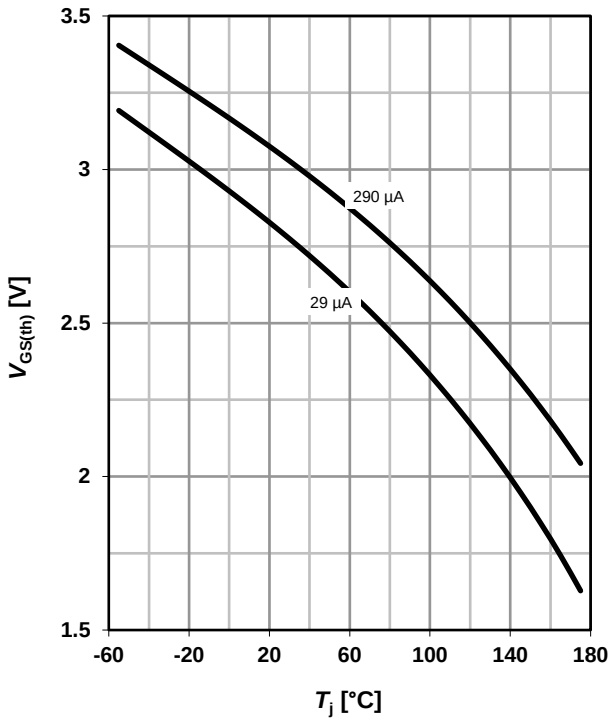
parameter: I_D, V_{GS}



9 Typ. gate threshold voltage

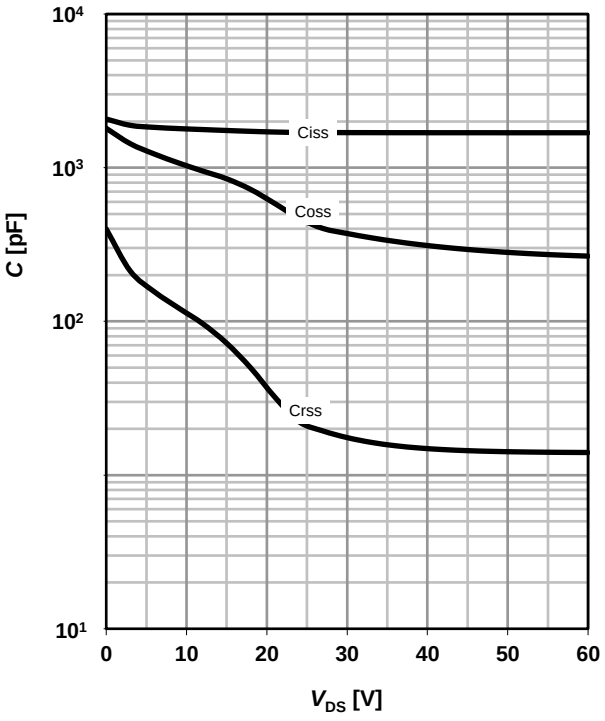
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



10 Typ. capacitances

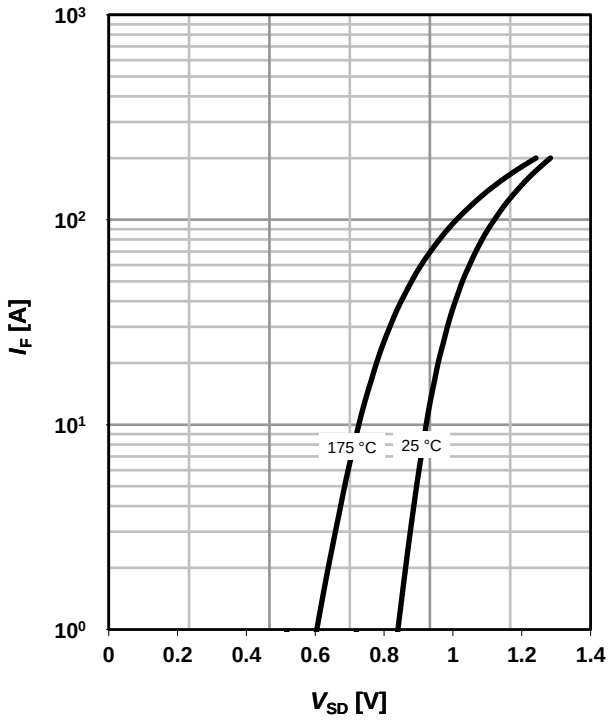
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz



11 Typical forward diode characteristics

$I_F = f(V_{SD})$

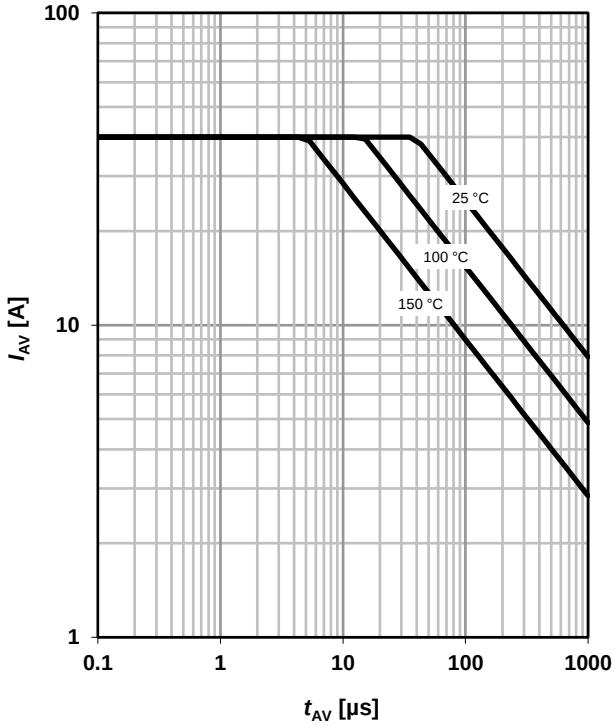
parameter: T_j



12 Avalanche characteristics

$I_{AS} = f(t_{AV})$

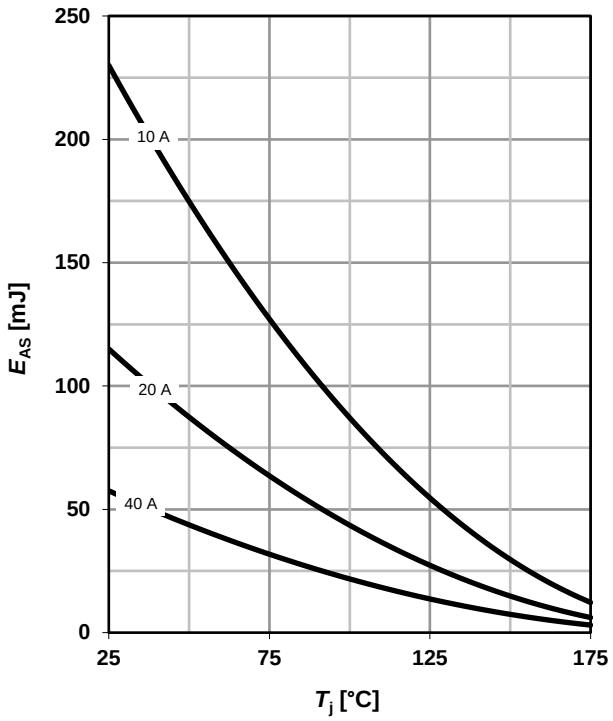
parameter: $T_{j(start)}$



13 Avalanche energy

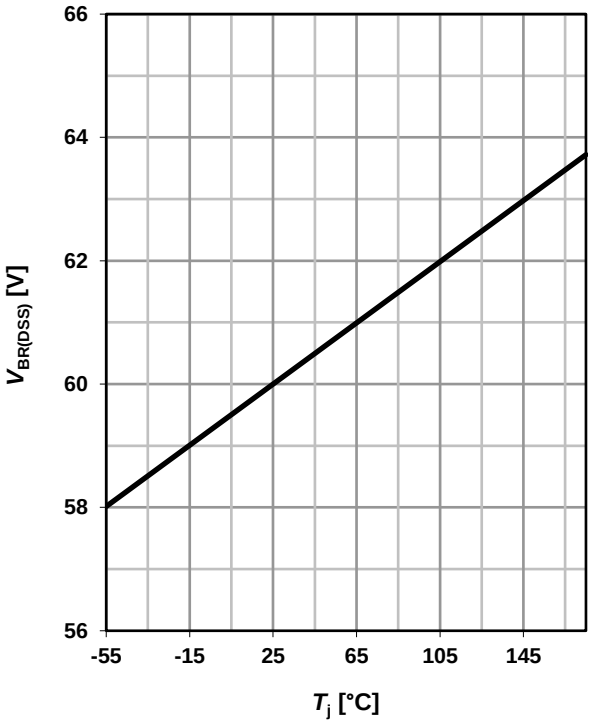
$E_{AS} = f(T_j)$

parameter: I_D



14 Drain-source breakdown voltage

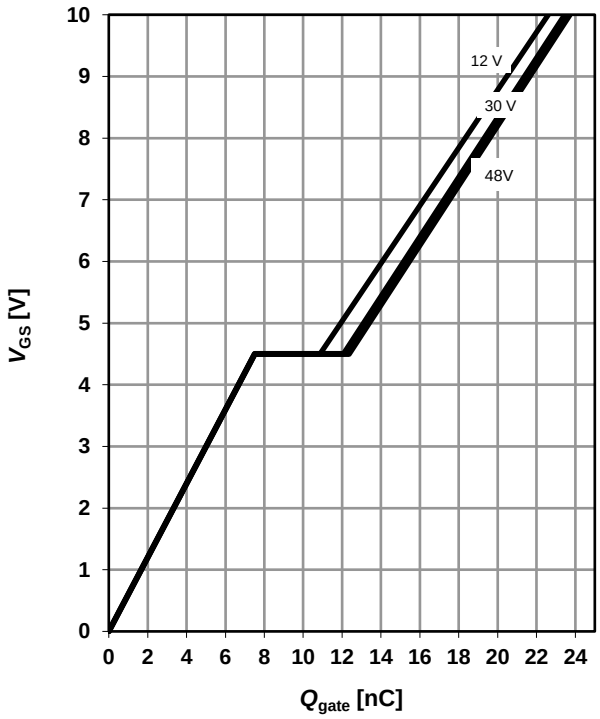
$V_{BR(DSS)} = f(T_j)$; $I_D = 1$ mA



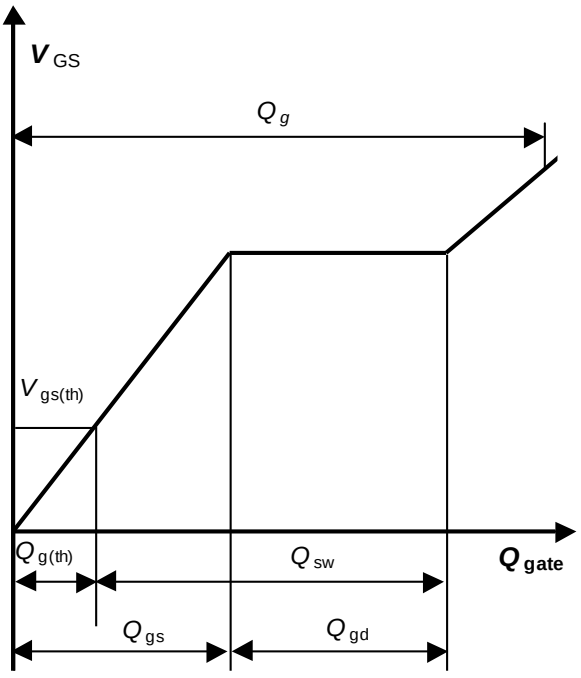
15 Typ. gate charge

$V_{GS} = f(Q_{gate})$; $I_D = 20$ A pulsed

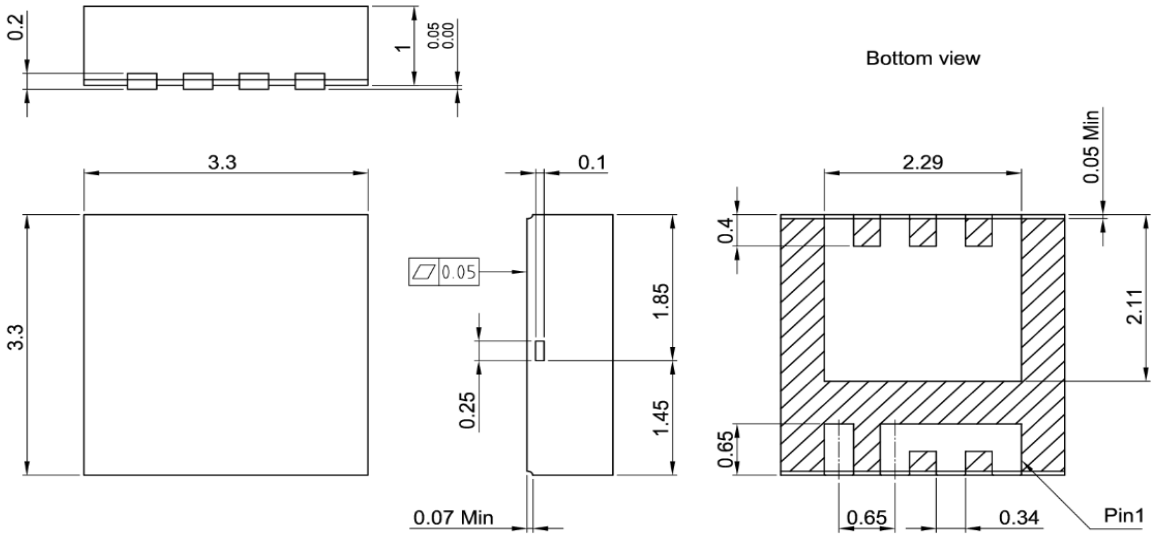
parameter: V_{DD}



16 Gate charge waveforms

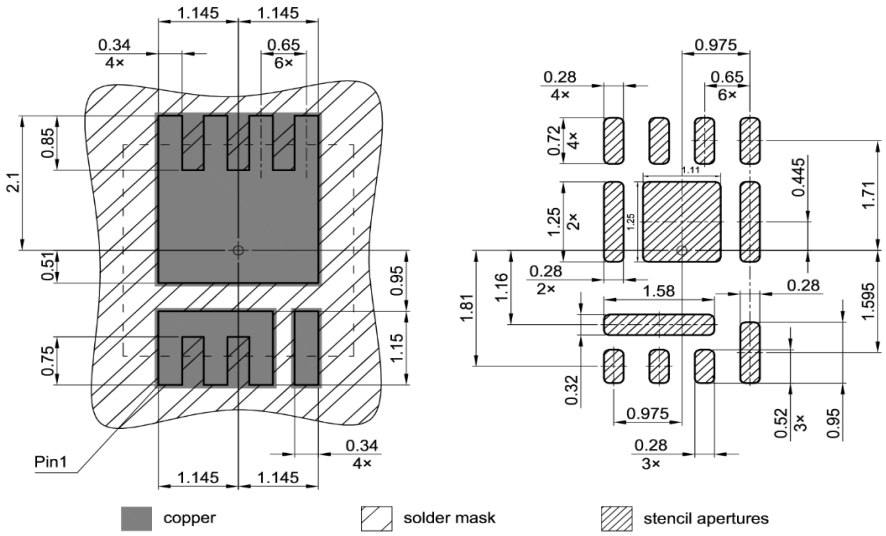


Package Outline



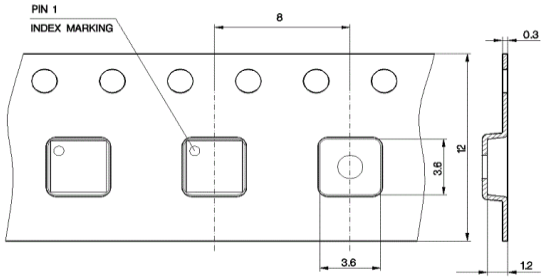
All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [⊕]

Footprint



All undimensioned radii is 0.075
Based on stencil thickness 0.13 mm
All dimensions are in units mm

Packaging



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If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Revision History

Version	Date	Changes
Revision 1.0	05.05.2020	Final Data Sheet
Revision 1.1	18.03.2021	Modified package outline and footprint