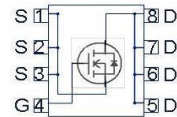


OptiMOS™3 Power-Transistor
Features

- Optimized for dc-dc conversion
- N-channel, normal level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC¹⁾ for target application
- Halogen-free according to IEC61249-2-21

Product Summary

V_{DS}	120	V
$R_{DS(on),max}$	24	mΩ
I_D	37	A


PG-TSDSON-8


Type	Package	Marking
BSZ240N12NS3 G	PG-TSDSON-8	240N12N

Maximum ratings, at $T_j=25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_C=25\text{ °C}$	37	A
		$T_C=100\text{ °C}$	24	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_C=25\text{ °C}$	148	
Avalanche energy, single pulse	E_{AS}	$I_D=20\text{ A}$, $R_{GS}=25\text{ }\Omega$	80	mJ
Gate source voltage	V_{GS}		± 20	V
Power dissipation	P_{tot}	$T_C=25\text{ °C}$	66	W
Operating and storage temperature	T_j , T_{stg}		-55 ... 150	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

¹⁾J-STD20 and JESD22

²⁾ see figure 3

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - case	R_{thJC}		-	-	1.9	K/W
Thermal resistance, junction - ambient	R_{thJA}	6 cm ² cooling area ³⁾	-	-	60	

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

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	120	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=35\text{ }\mu\text{A}$	2	3	4	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$	-	0.1	1	μA
		$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ }^\circ\text{C}$	-	10	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=20\text{ A}$	-	21	24	$\text{m}\Omega$
Gate resistance	R_G		-	1.4	-	Ω
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=20\text{ A}$	15	29	-	S

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.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=60\text{ V},$ $f=1\text{ MHz}$	-	1400	1900	pF
Output capacitance	C_{oss}		-	170	230	
Reverse transfer capacitance	C_{rss}		-	11	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=60\text{ V}, V_{GS}=10\text{ V},$ $I_D=19\text{ A}, R_G=1.6\ \Omega$	-	9	-	ns
Rise time	t_r		-	4	-	
Turn-off delay time	$t_{d(off)}$		-	13	-	
Fall time	t_f		-	4	-	

Gate Charge Characteristics⁴⁾

Gate to source charge	Q_{gs}	$V_{DD}=60\text{ V}, I_D=19\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	7	-	nC
Gate to drain charge	Q_{gd}		-	5	-	
Switching charge	Q_{sw}		-	8	-	
Gate charge total	Q_g		-	20	27	
Gate plateau voltage	$V_{plateau}$		-	5.2	-	
Output charge	Q_{oss}	$V_{DD}=60\text{ V}, V_{GS}=0\text{ V}$	-	23	31	nC

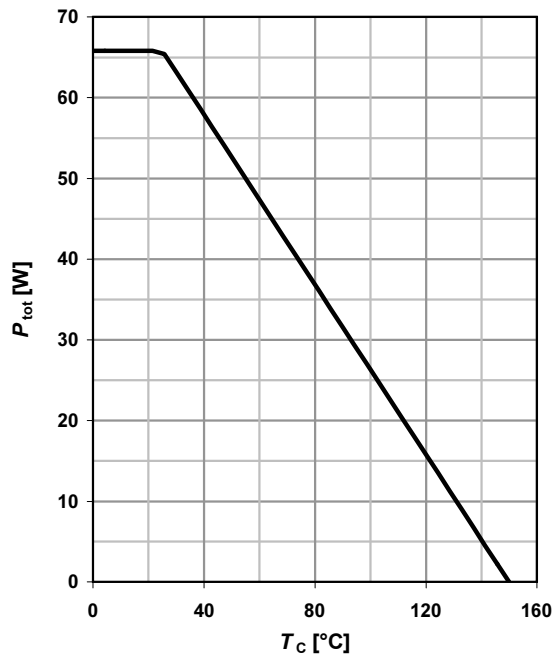
Reverse Diode

Diode continuous forward current	I_S	$T_C=25\text{ }^\circ\text{C}$	-	-	37	A
Diode pulse current	$I_{S,pulse}$		-	-	148	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=20\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.9	1.2	V
Reverse recovery time	t_{rr}	$V_R=60\text{ V}, I_F=19\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	70	-	ns
Reverse recovery charge	Q_{rr}		-	208	-	nC

⁴⁾ See figure 16 for gate charge parameter definition

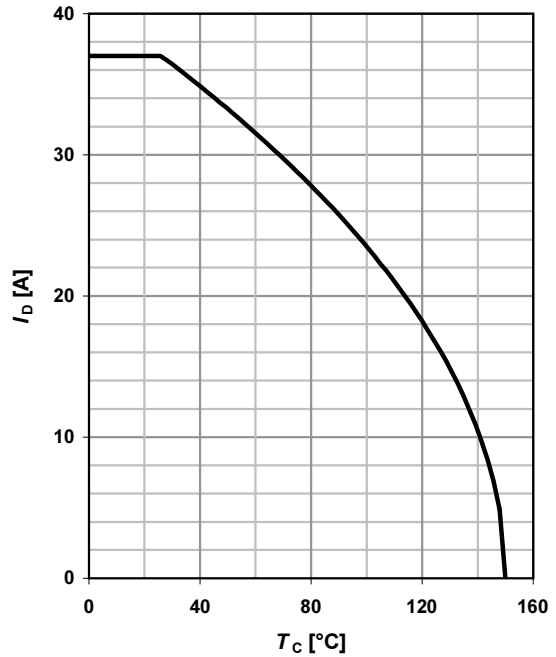
1 Power dissipation

$P_{tot}=f(T_C)$



2 Drain current

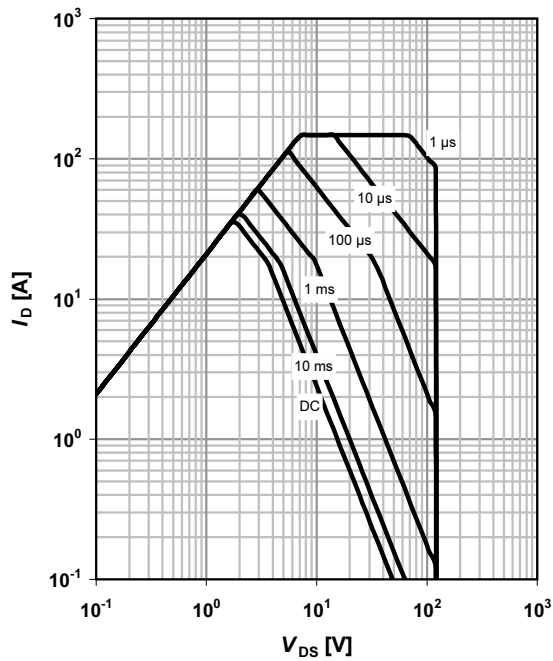
$I_D=f(T_C); V_{GS} \geq 10 V$



3 Safe operating area

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

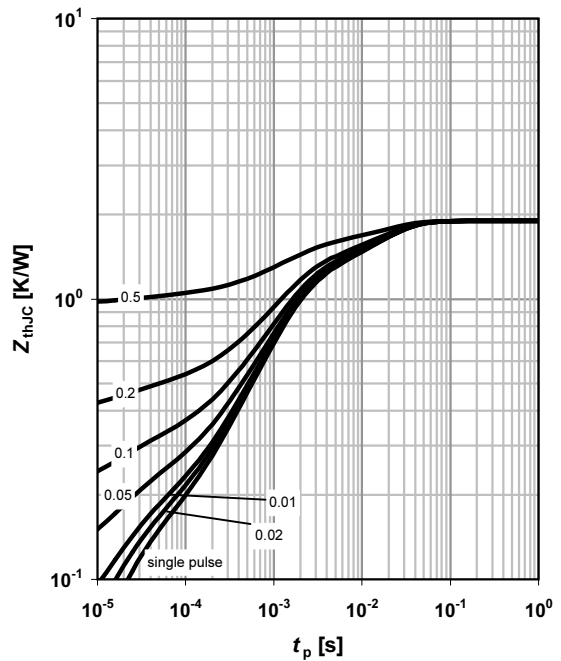
parameter: t_p



4 Max. transient thermal impedance

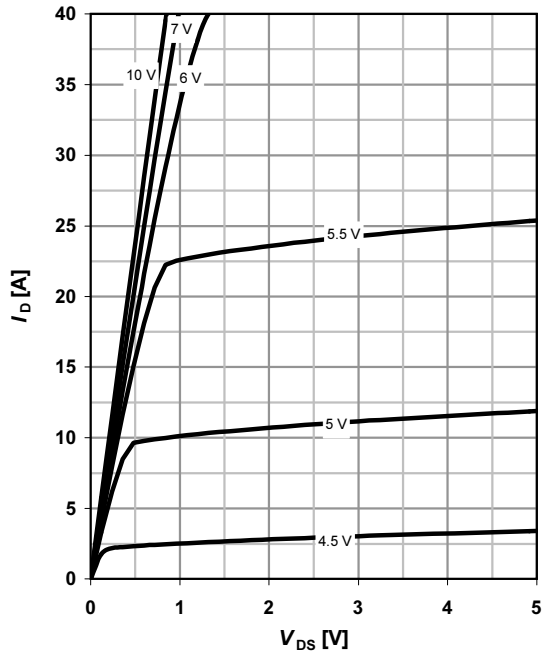
$Z_{thJC}=f(t_p)$

parameter: $D=t_p/T$

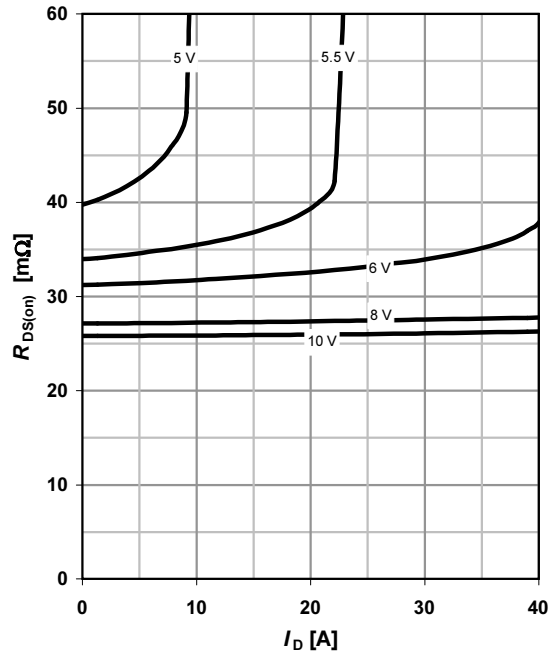


5 Typ. output characteristics

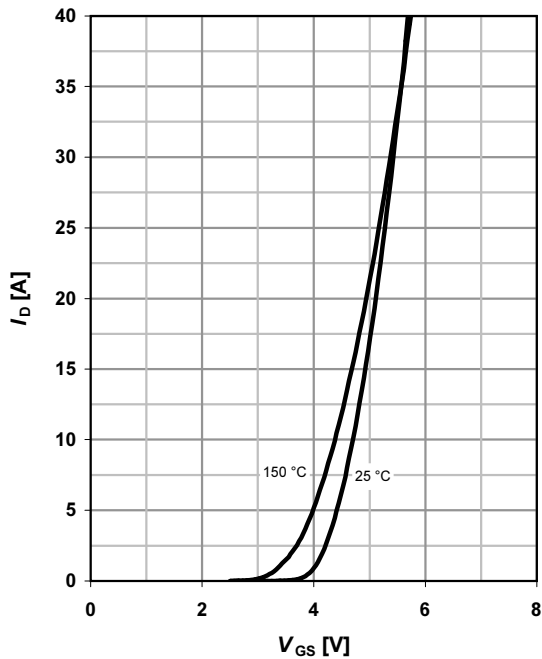
$$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}$$

 parameter: V_{GS}

6 Typ. drain-source on resistance

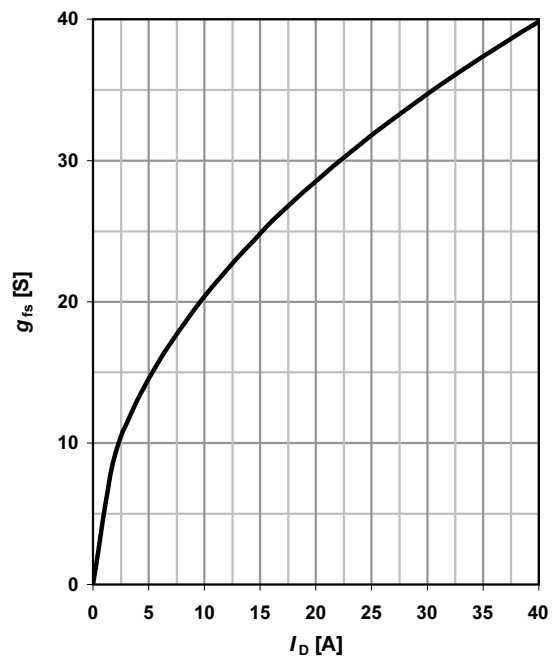
$$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$$

 parameter: V_{GS}

7 Typ. transfer characteristics

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

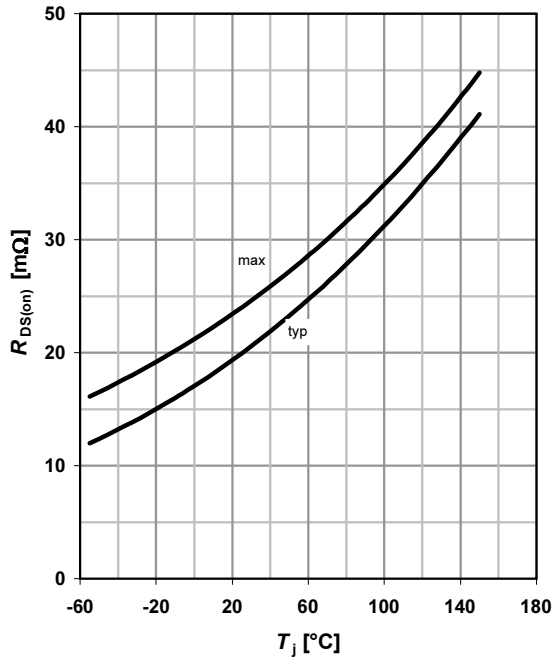
 parameter: T_j

8 Typ. forward transconductance

$$g_{fs} = f(I_D); T_j = 25\text{ }^\circ\text{C}$$



9 Drain-source on-state resistance

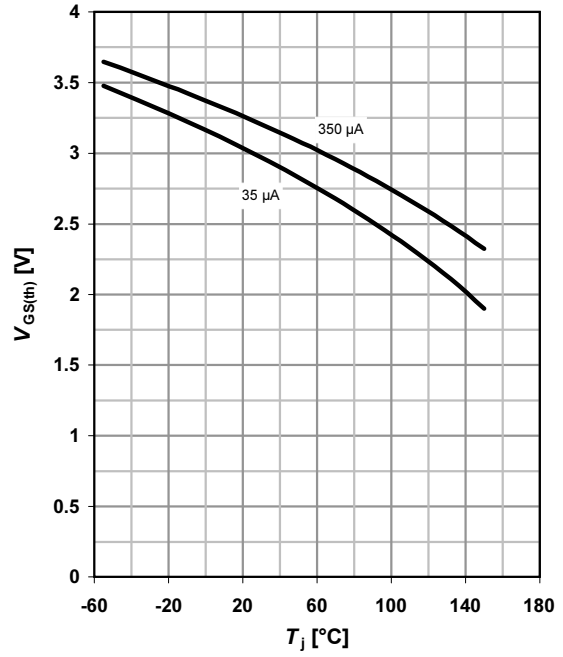
$R_{DS(on)} = f(T_j); I_D = 20A; V_{GS} = 10V$



10 Typ. gate threshold voltage

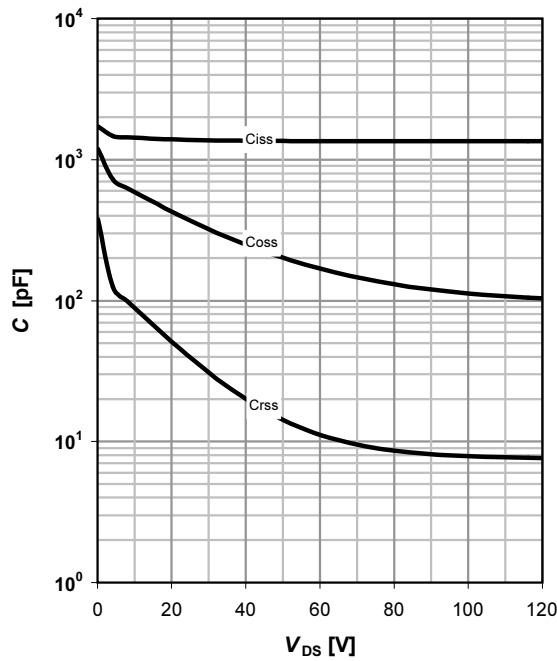
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$

parameter: I_D



11 Typ. capacitances

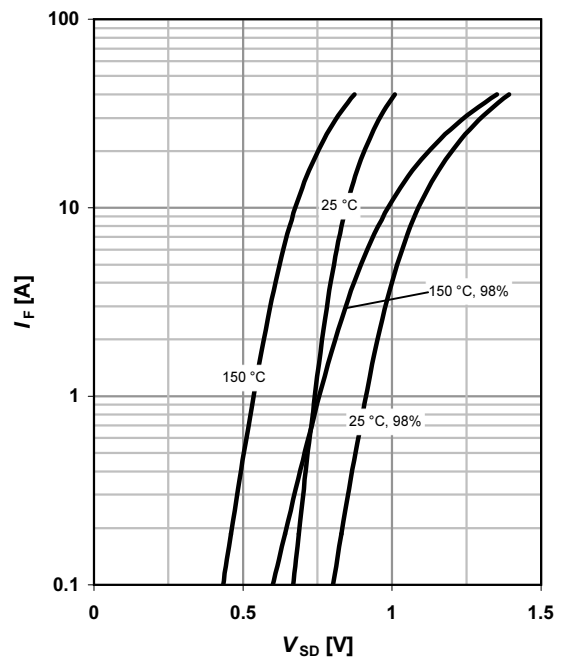
$C = f(V_{DS}); V_{GS} = 0V; f = 1MHz$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

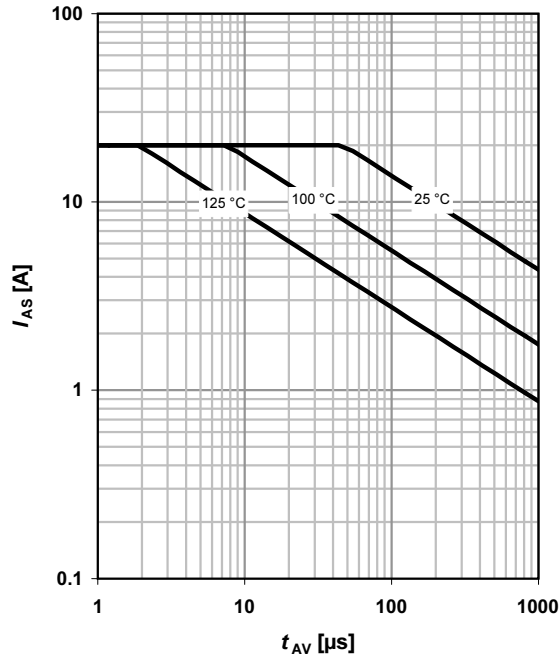
parameter: T_j



13 Avalanche characteristics

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

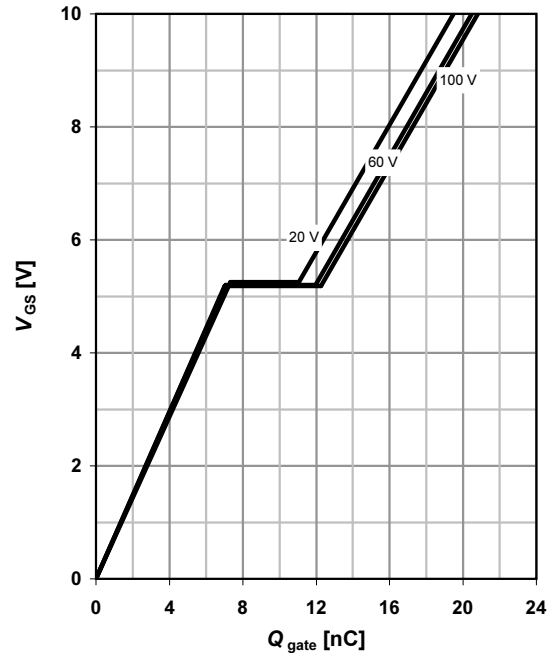
parameter: $T_{j(start)}$



14 Typ. gate charge

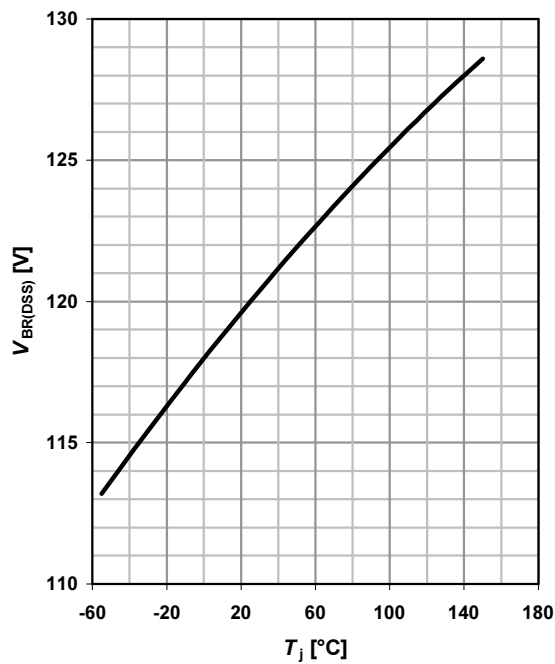
$V_{GS}=f(Q_{gate}); I_D=19 \text{ A pulsed}$

parameter: V_{DD}



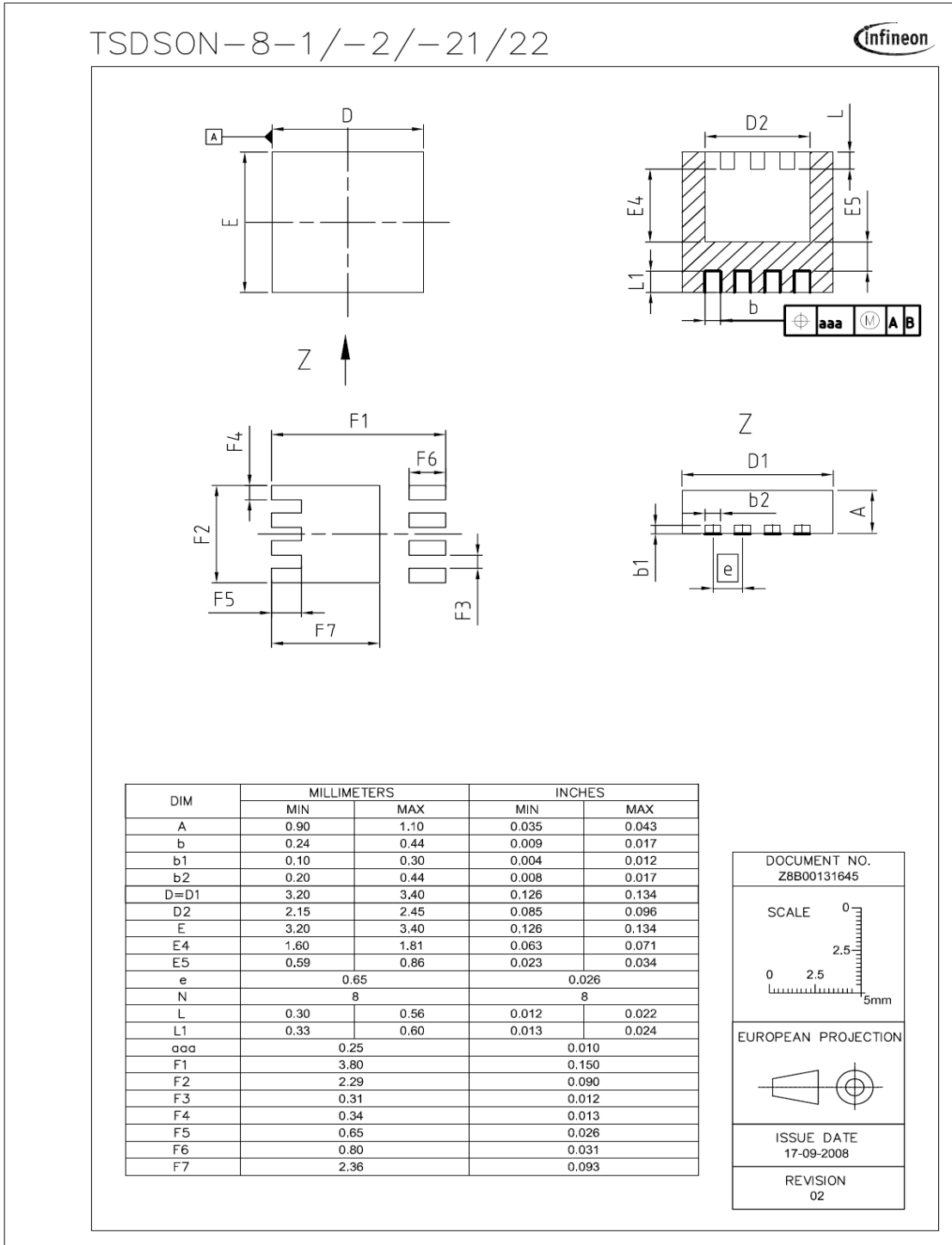
15 Drain-source breakdown voltage

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



16 Gate charge waveforms



Package Outline:PG-TSDSON-8


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