



**THE DATASHEET OF  
IAUT165N08S5N029ATMA2**



**OptiMOS™-5 Power-Transistor**

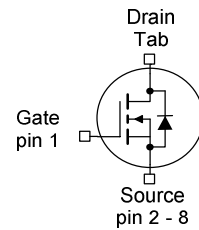
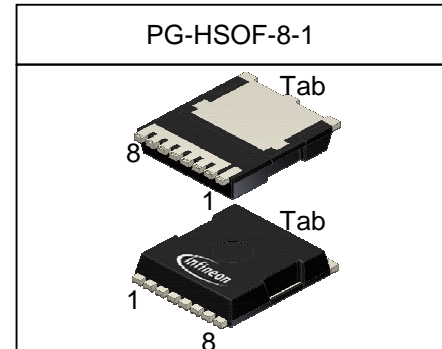
**Features**

- N-channel - Enhancement mode
- AEC qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green product (RoHS compliant)
- Ultra low Rds(on)
- 100% Avalanche tested

Type	Package	Marking
IAUT165N08S5N029	PG-HSOF-8-1	5N08029

**Product Summary**

$V_{DS}$	80	V
$R_{DS(on)}$	2.9	mΩ
$I_D$	165	A


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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_C=25\text{ °C}$ , $V_{GS}=10\text{ V}^{1)}$	165	A
		$T_C=100\text{ °C}$ , $V_{GS}=10\text{ V}^{2)}$	120	
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	$T_C=25\text{ °C}$	660	
Avalanche energy, single pulse <sup>2)</sup>	$E_{AS}$	$I_D=83\text{ A}$	225	mJ
Avalanche current, single pulse	$I_{AS}$	-	165	A
Gate source voltage	$V_{GS}$	-	±20	V
Power dissipation	$P_{tot}$	$T_C=25\text{ °C}$	167	W
Operating and storage temperature	$T_j, T_{stg}$	-	-55 ... +175	°C
IEC climatic category; DIN IEC 68-1	-	-	55/175/56	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
<b>Thermal characteristics<sup>2)</sup></b>						
Thermal resistance, junction - case	$R_{thJC}$	-	-	-	0.9	K/W

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

Drain-source breakdown voltage <sup>2)</sup>	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$ , $I_D=1\text{ mA}$	80	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ , $I_D=108\text{ }\mu\text{A}$	2.2	3	3.8	
Zero gate voltage drain current <sup>2)</sup>	$I_{DSS}$	$V_{DS}=80\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$	-	0.1	1	$\mu\text{A}$
		$V_{DS}=50\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=85\text{ °C}^{2)}$	-	1	20	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20\text{ V}$ , $V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=6\text{ V}$ , $I_D=40\text{ A}$	-	2.9	4.4	$\text{m}\Omega$
		$V_{GS}=10\text{ V}$ , $I_D=80\text{ A}$	-	2.4	2.9	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics<sup>2)</sup>**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V},$ $f=1\text{ MHz}$	-	4900	6370	pF
Output capacitance	$C_{oss}$		-	790	1027	
Reverse transfer capacitance	$C_{rss}$		-	36	54	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V},$ $I_D=100\text{ A}, R_G=3.5\ \Omega$	-	13	-	ns
Rise time	$t_r$		-	9	-	
Turn-off delay time	$t_{d(off)}$		-	23	-	
Fall time	$t_f$		-	29	-	

**Gate Charge Characteristics<sup>2)</sup>**

Gate to source charge	$Q_{gs}$	$V_{DD}=40\text{ V}, I_D=100\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	24	31	nC
Gate to drain charge	$Q_{gd}$		-	15	23	
Gate charge total	$Q_g$		-	70	90	
Gate plateau voltage	$V_{plateau}$		-	5.0	-	V

**Reverse Diode**

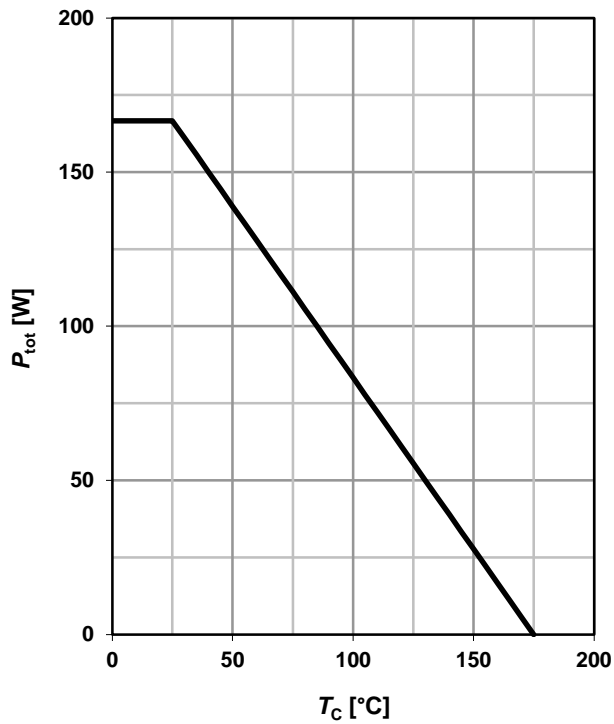
Diode continuous forward current <sup>2)</sup>	$I_S$	$T_C=25\text{ °C}$	-	-	165	A
Diode pulse current <sup>2)</sup>	$I_{S,pulse}$		-	-	660	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=100\text{ A},$ $T_j=25\text{ °C}$	-	0.9	1.2	V
Reverse recovery time <sup>2)</sup>	$t_{rr}$	$V_R=40\text{ V}, I_F=50\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	60	-	ns
Reverse recovery charge <sup>2)</sup>	$Q_{rr}$		-	96	-	nC

<sup>1)</sup> Current is limited by bondwire; with an  $R_{thJC} = 0.9\text{ K/W}$  the chip is able to carry 171A at 25°C.

<sup>2)</sup> Defined by design. Not subject to production test.

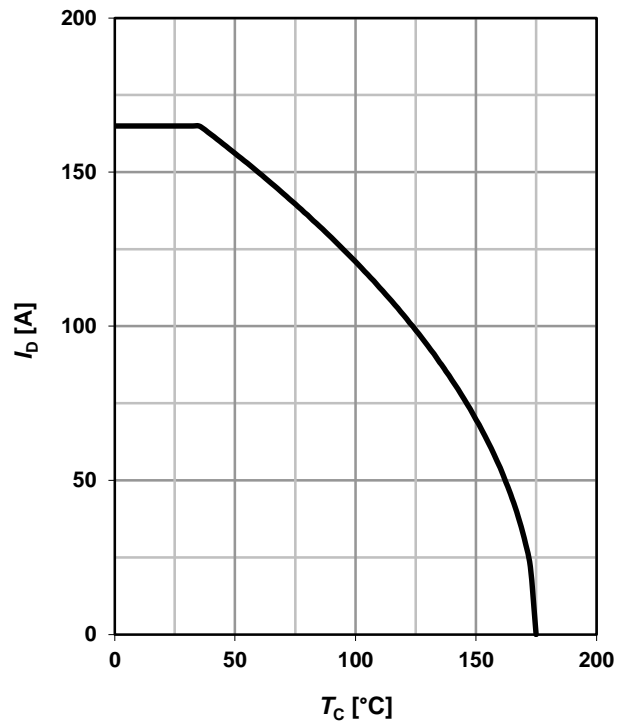
### 1 Power dissipation

$$P_{\text{tot}} = f(T_C); V_{\text{GS}} \geq 6 \text{ V}$$



### 2 Drain current

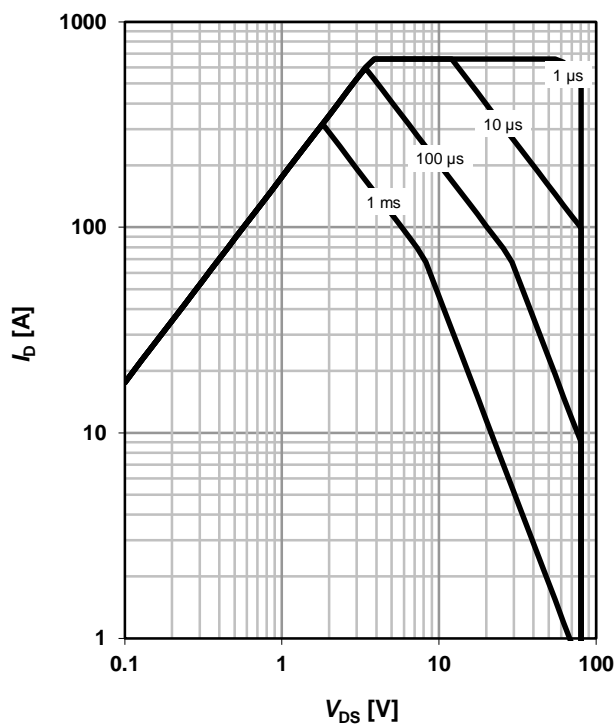
$$I_D = f(T_C); V_{\text{GS}} \geq 6 \text{ V}$$



### 3 Safe operating area

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

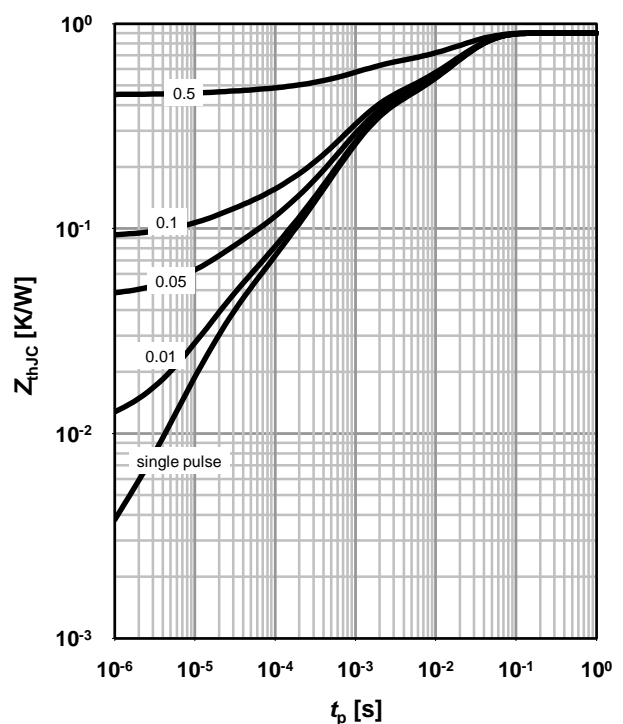
parameter:  $t_p$



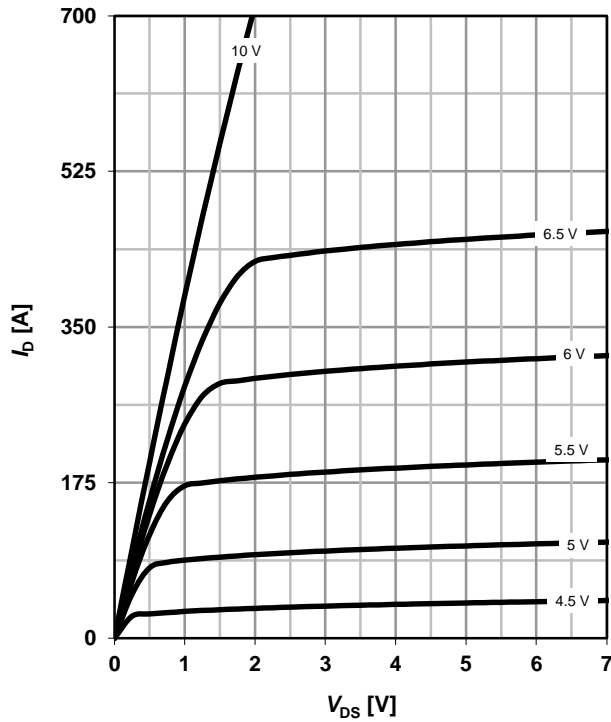
### 4 Max. transient thermal impedance

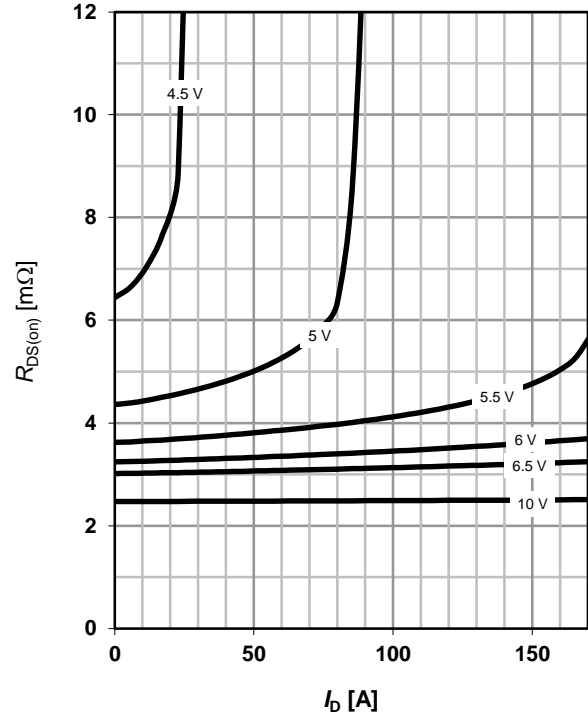
$$Z_{\text{thJC}} = f(t_p)$$

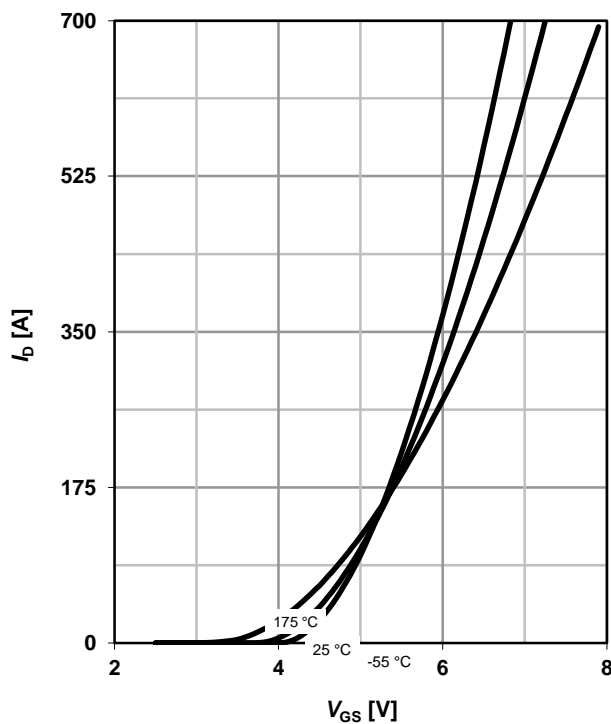
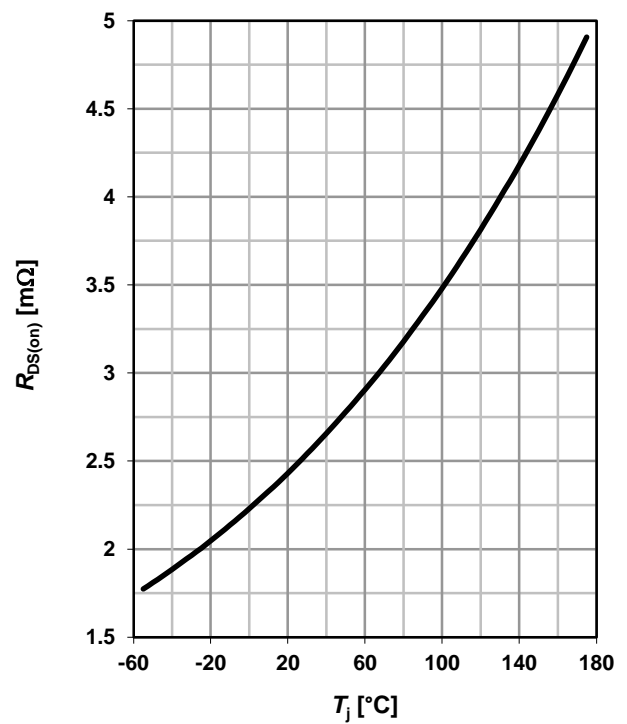
parameter:  $D = t_p/T$



**5 Typ. output characteristics**
 $I_D = f(V_{DS}); T_j = 25\text{ °C}$ 

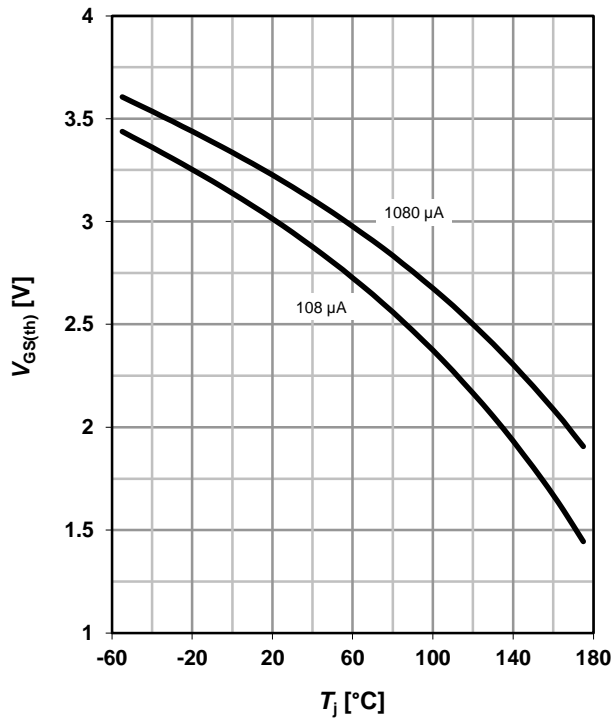
 parameter:  $V_{GS}$ 

**6 Typ. drain-source on-state resistance**
 $R_{DS(on)} = f(I_D); T_j = 25\text{ °C}$ 

 parameter:  $V_{GS}$ 

**7 Typ. transfer characteristics**
 $I_D = f(V_{GS}); V_{DS} = 6\text{ V}$ 

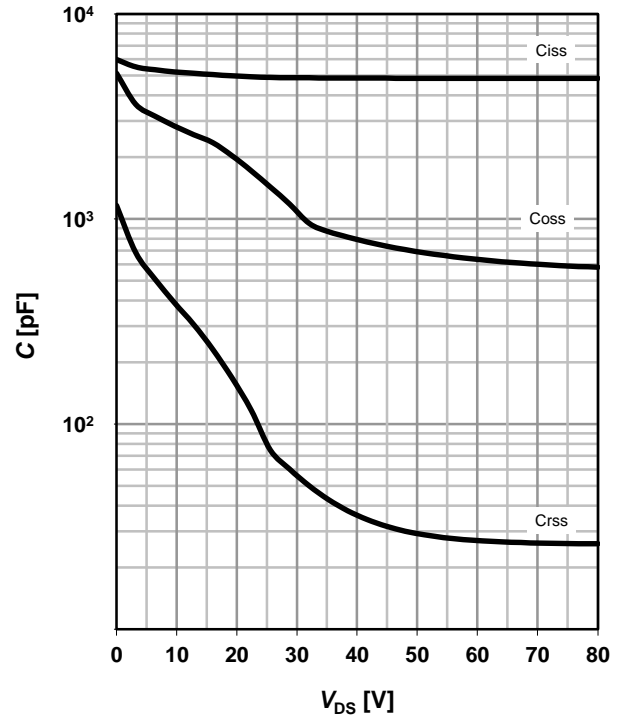
 parameter:  $T_j$ 

**8 Typ. drain-source on-state resistance**
 $R_{DS(on)} = f(T_j); I_D = 80\text{ A}; V_{GS} = 10\text{ V}$ 


**9 Typ. gate threshold voltage**

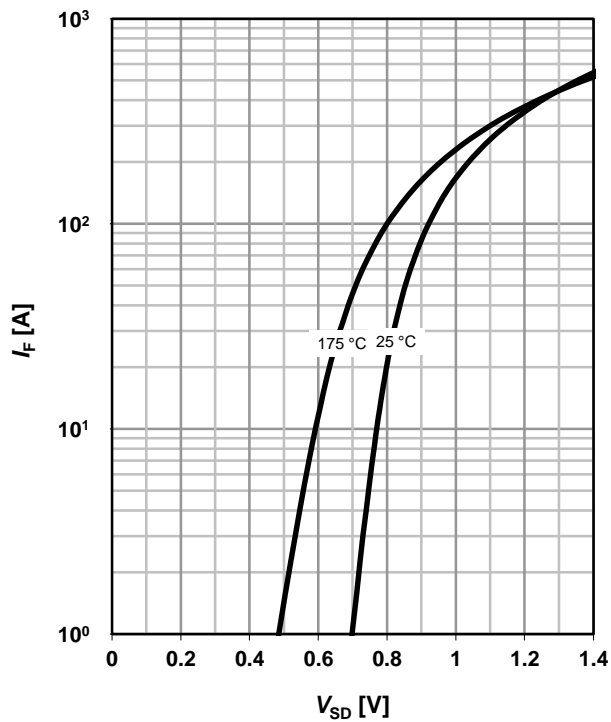
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

 parameter:  $I_D$ 

**10 Typ. capacitances**

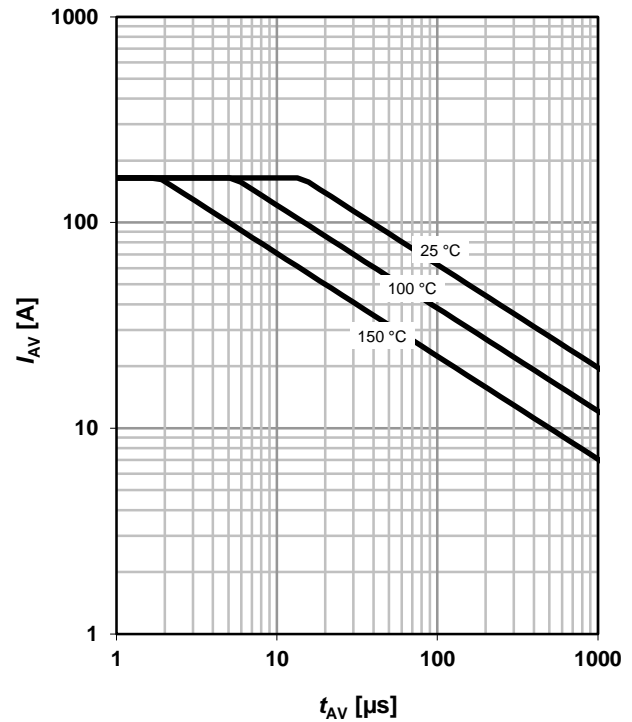
$$C = f(V_{DS}); V_{GS} = 0 V; f = 1 MHz$$


**11 Typical forward diode characteristics**

$$I_F = f(V_{SD})$$

 parameter:  $T_j$ 

**12 Typ. avalanche characteristics**

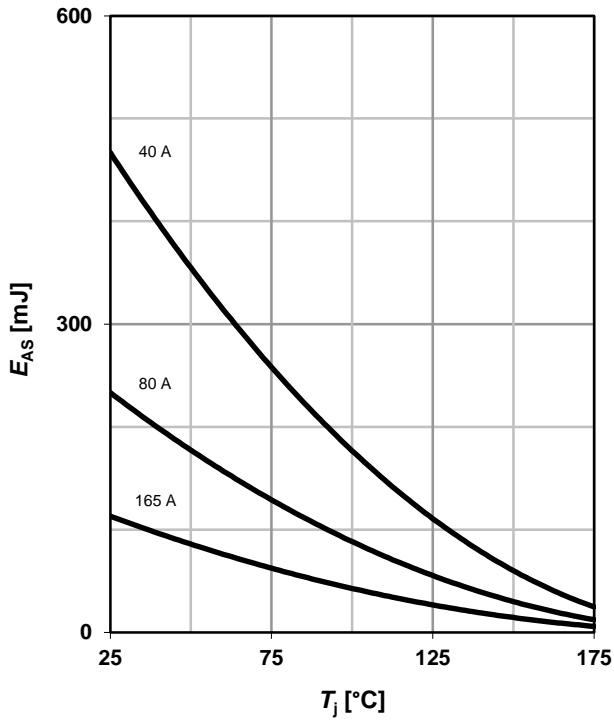
$$I_{AS} = f(t_{AV})$$

 parameter:  $T_{j(start)}$ 


**13 Typical avalanche energy**

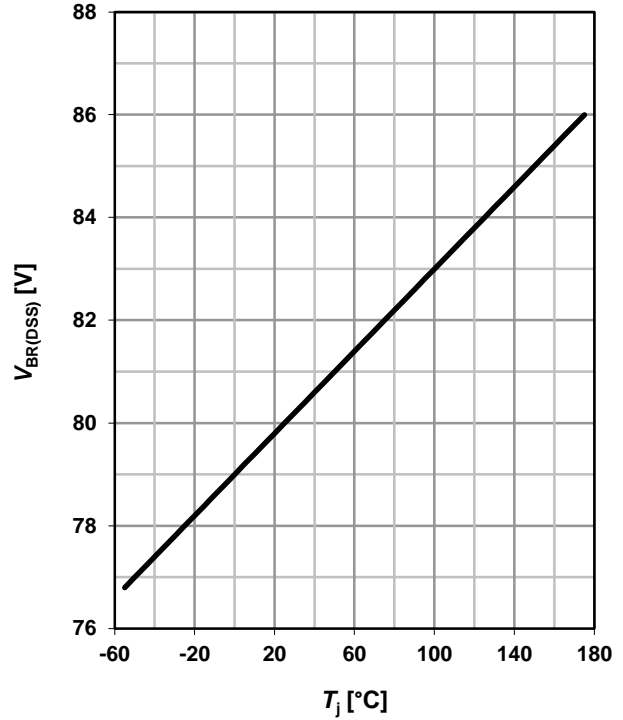
$$E_{AS} = f(T_j)$$

parameter:  $I_D$



**14 Drain-source breakdown voltage**

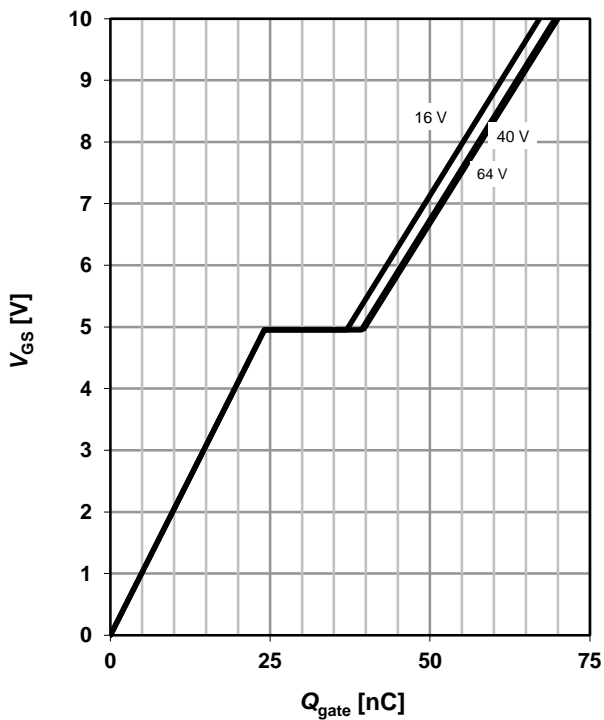
$$V_{BR(DSS)} = f(T_j); I_{D\_typ} = 1 \text{ mA}$$



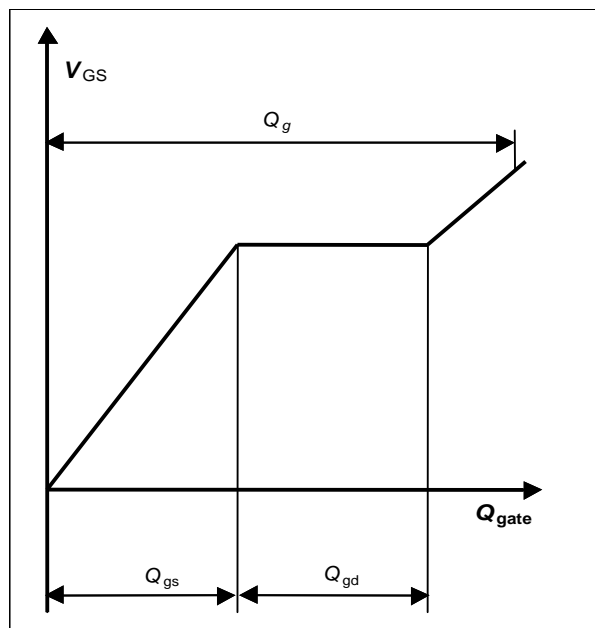
**15 Typ. gate charge**

$$V_{GS} = f(Q_{gate}); I_D = 100 \text{ A pulsed}$$

parameter:  $V_{DD}$



**16 Gate charge waveforms**



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## Revision History

Version	Date	Changes
Version 1.0	29.11.2016	Final Data Sheet
Version 1.1	26.04.2023	Clarified naming

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