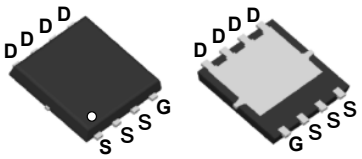
MTR013N12SD

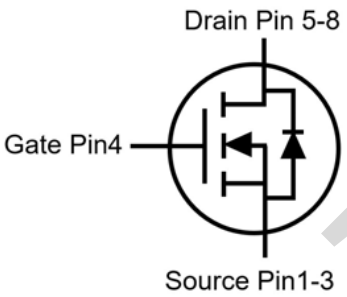
10-JUN-2021

SGT N-channel Power MOSFET

MTR013N12SD

PDFN5x6





V_{DS}	120	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	10	mΩ
I_D	68	A

Features

1、Low on – resistance

2、High power package (PDFN5X6)

3、SGT N-channel Power MOSFET

Applications

1、UPS (Uninterrupible Power Supplies)

2、AC/DC Quick Charger

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

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		120	V
V_{GS}	Gate-Source voltage		±20	V
I_D	Continuous drain current @VGS=10V	T_C =25°C	68	A
		T_C =100°C	53	A
I_{DM}	Pulse drain current tested ①	T_C =25°C	272	A
EAS	Avalanche energy, single pulsed ②		162	mJ
P_D	Maximum power dissipation	T_C =25°C	114	W
T_{STG},T_J	Storage and Junction Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.64	1.1	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	62	°C/W

Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @Tj=25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	120	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=120V,V_{GS}=0V	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.2	--	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance ④	V_{GS}=10V, I_D=40A	--	10	13	mΩ

Dynamic Electrical Characteristics@Tj = 25°C (unless otherwise stated)

C_{iss}	Input Capacitance	V_{DS}=40V,V_{GS}=0V , f=1MHz	--	1517	--	pF
C_{oss}	Output Capacitance		--	606	--	pF
C_{rss}	Reverse Transfer Capacitance		--	9.8	--	pF
R_g	Gate Resistance	V_{DS}=0V,f =1MHz	--	1.0	--	Ω
Q_g	Total Gate Charge	V_{DS}=60V, I_D=17A , V_{GS}=10V	--	51	--	nC
Q_{gs}	Gate-Source Charge		--	11.4	--	nC
Q_{gd}	Gate-Drain Charge		--	8.4	--	nC

Switching Characteristics

Td(on)	Turn-on Delay Time	Tj=25°C, V_{GS}=10V, V_{DS}=60V, I_D=17A, R_g=1.6Ω	--	8	--	ns
Tr	Turn-on Rise Time		--	5	--	ns
Td(off)	Turn-Off Delay Time		--	22	--	ns
Tf	Turn-Off Fall Time		--	6	--	ns

Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)

V_{SD}	Forward on voltage	I_{SD}=34A,V_{GS}=0V	--	--	1.2	V
Trr	Reverse Recovery Time	I_F=17A di/dt=100A/μs	--	85	--	ns
Qrr	Reverse Recovery Charge		--	220	--	nC

NOTE: ① Repetitive rating; pulse width limited by max junction temperature.

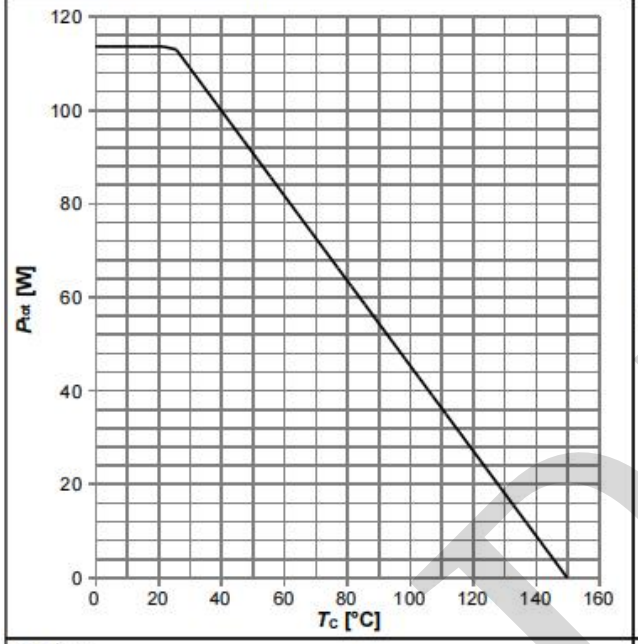
② Limited by T_{Jmax}, s tarting T_J = 2 5°C, L=0.5mH,Rg=25Ω. Part not recommended for use above this value

③ The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 300μs; duty cycle≤ 2%.

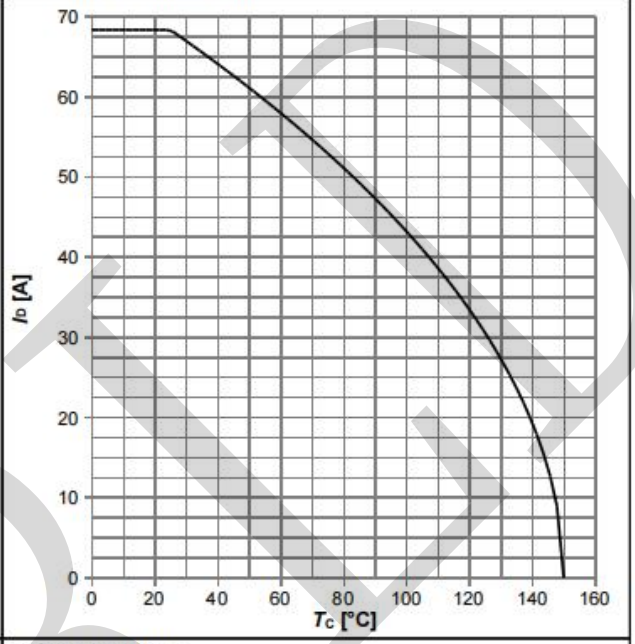
Typical Characteristics

Diagram 1: Power dissipation



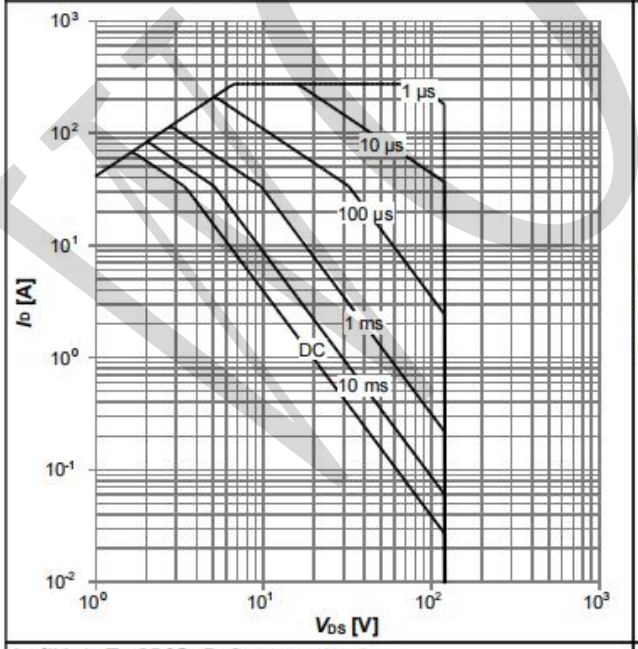
$P_{tot}=f(T_C)$

Diagram 2: Drain current



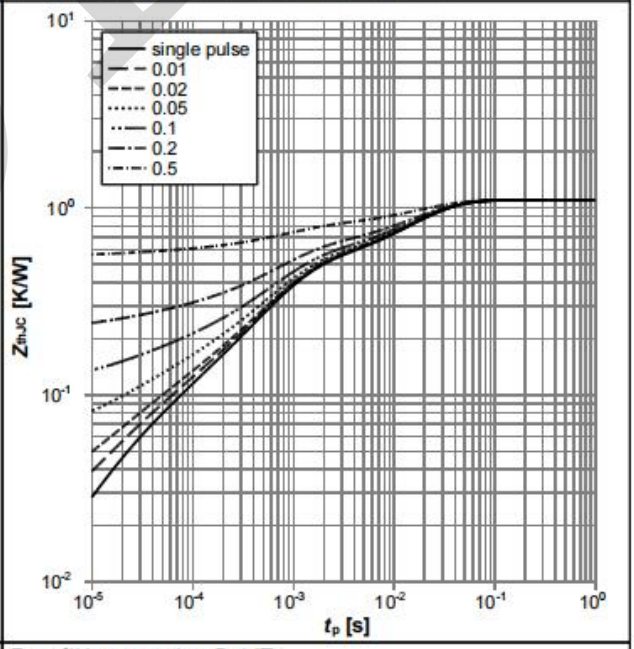
$I_D=f(T_C)$; $V_{GS}\geq 10$ V

Diagram 3: Safe operating area



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

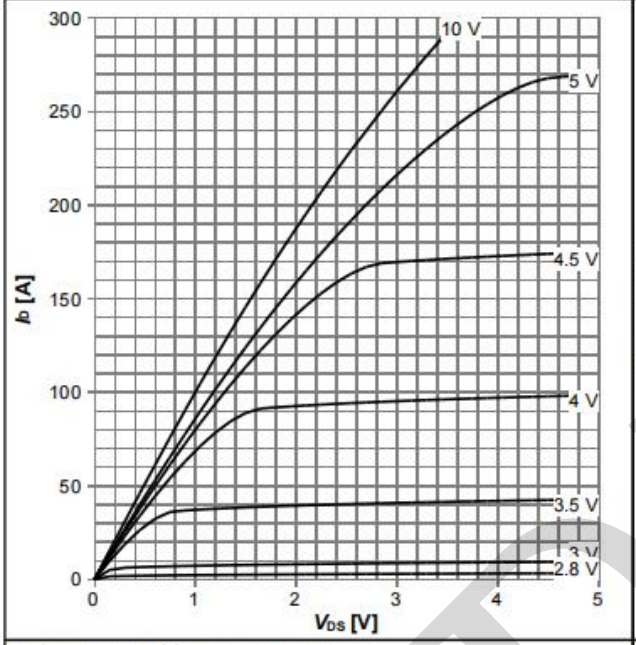
Diagram 4: Max. transient thermal impedance



$Z_{thJC}=f(t_p)$; parameter: $D=t_p/T$

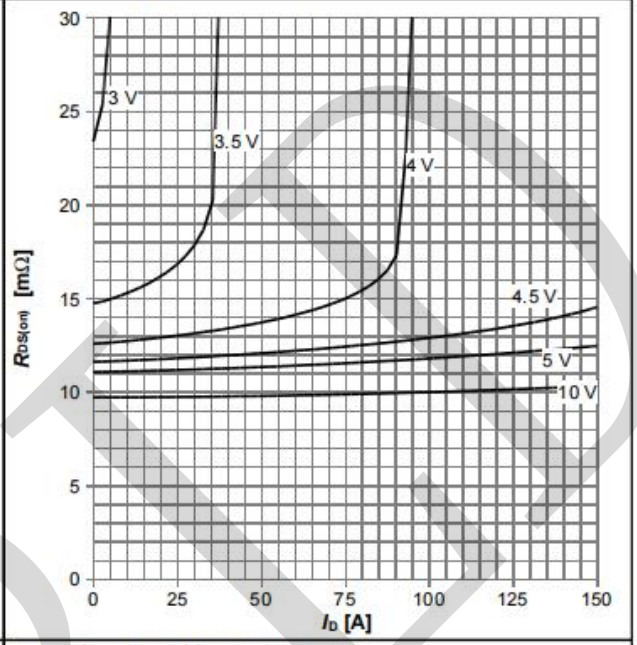
Typical Characteristics

Diagram 5: Typ. output characteristics



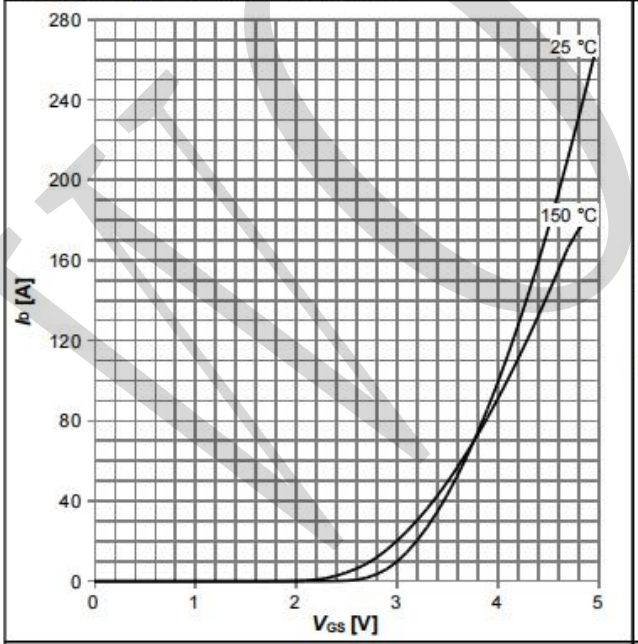
$I_D=f(V_{DS})$, T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



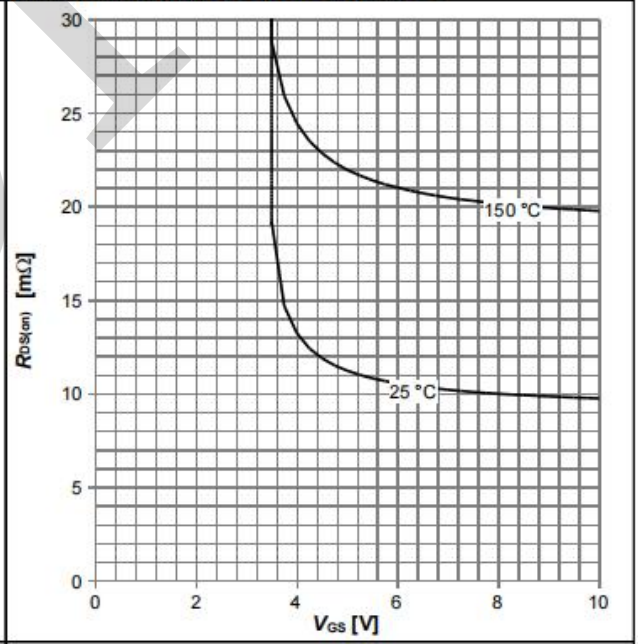
$R_{DS(on)}=f(I_D)$, T_j=25 °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



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

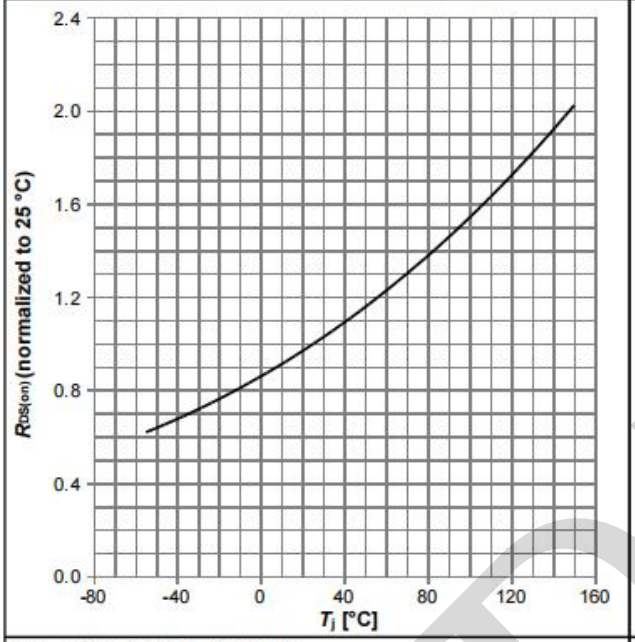
Diagram 8: Typ. drain-source on resistance



$R_{DS(on)}=f(V_{GS})$, I_D=50 A; parameter: T_j

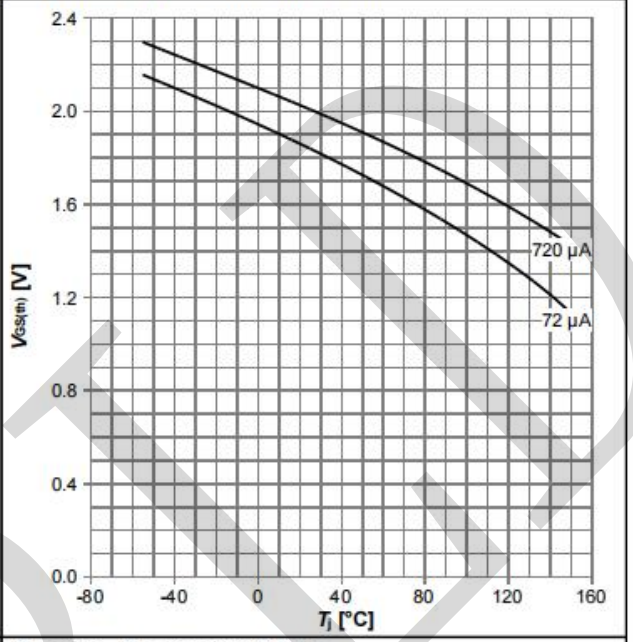
Typical Characteristics

Diagram 9: Normalized drain-source on resistance



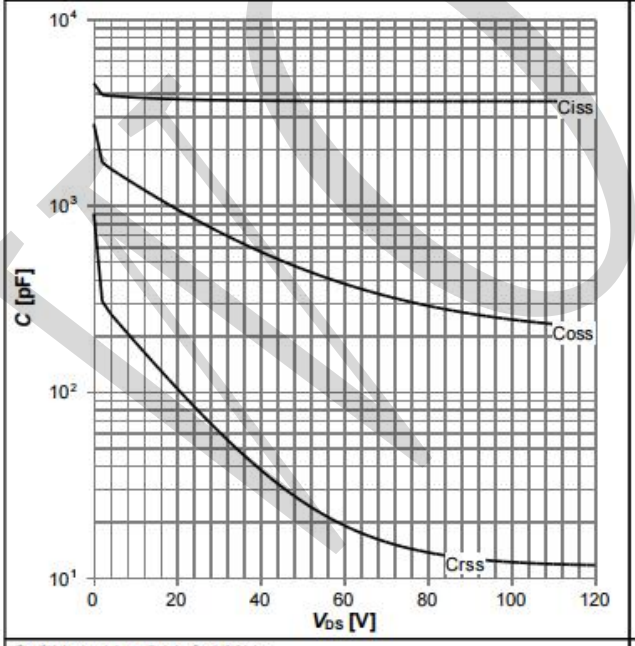
$R_{DS(on)}=f(T_j)$, $I_D=50$ A, $V_{GS}=10$ V

Diagram 10: Typ. gate threshold voltage



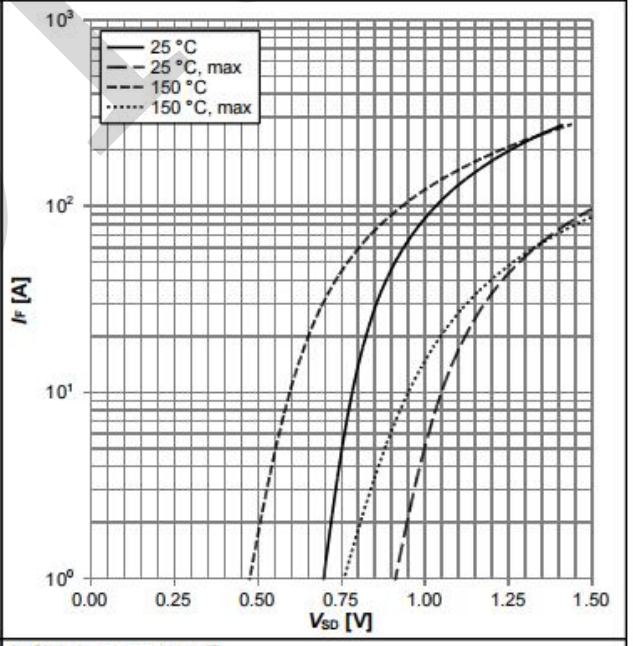
$V_{GS(th)}=f(T_j)$, $V_{GS}=V_{DS}$; parameter: I_D

Diagram 11: Typ. capacitances



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

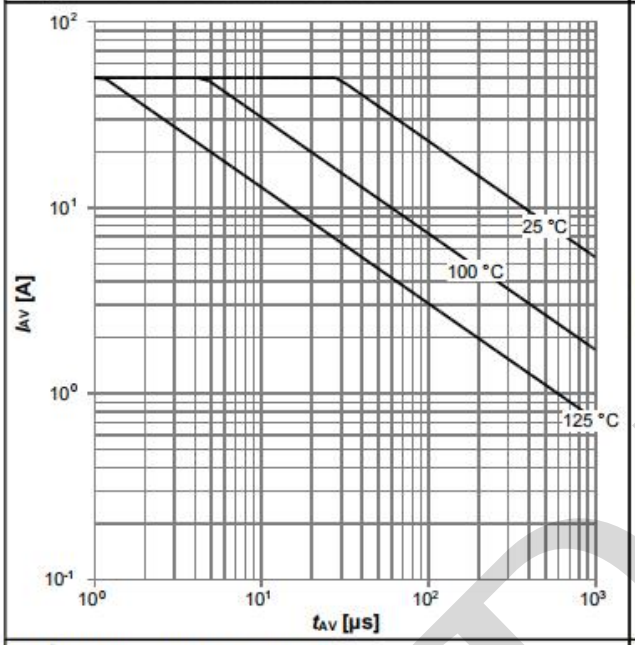
Diagram 12: Forward characteristics of reverse diode



$I_F=f(V_{SD})$; parameter: T_j

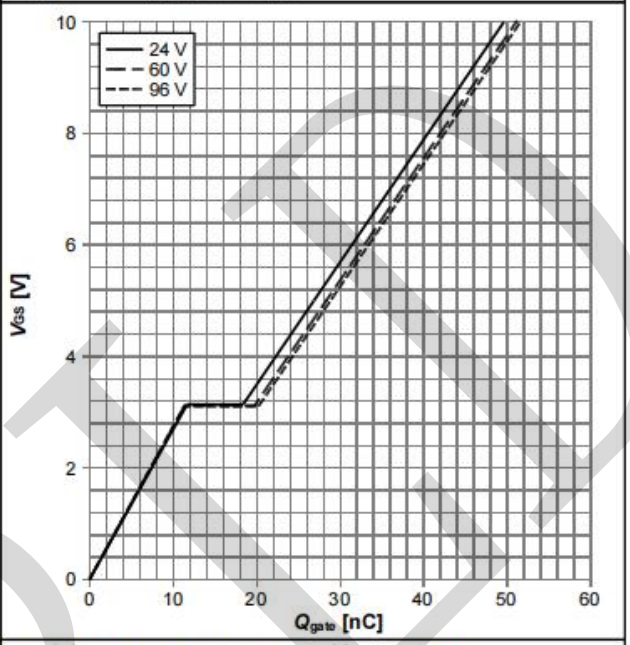
Typical Characteristics

Diagram 13: Avalanche characteristics



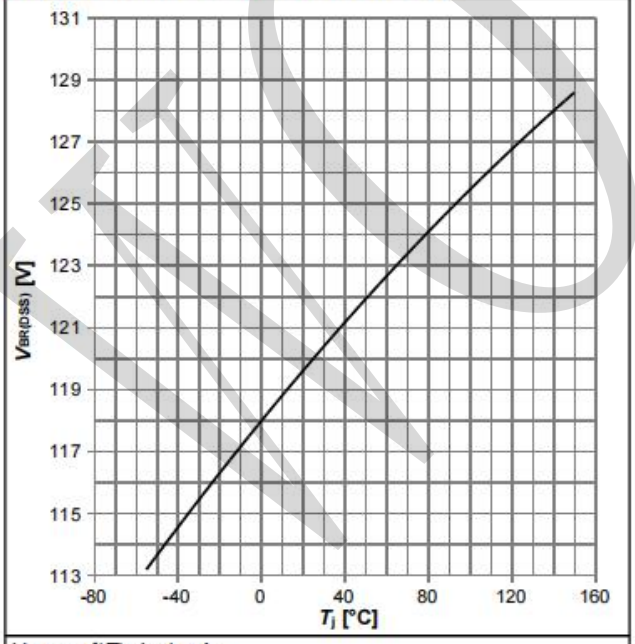
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



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

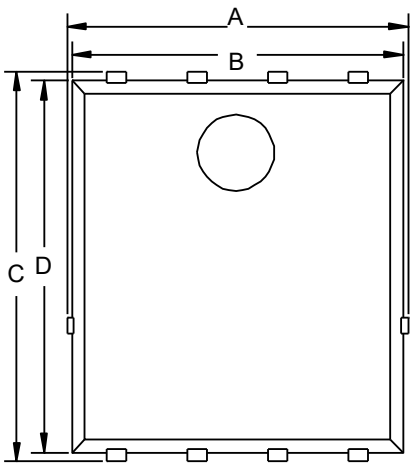
Diagram 15: Drain-source breakdown voltage



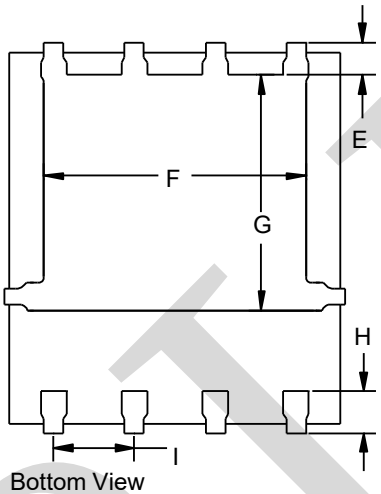
$V_{BR(DSS)}$=f(T_j); I_D=1 mA

DRAFT

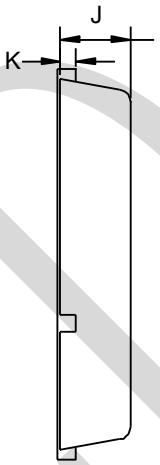
PACKAGE OUTLINE DIMENSIONS



Top View



Bottom View

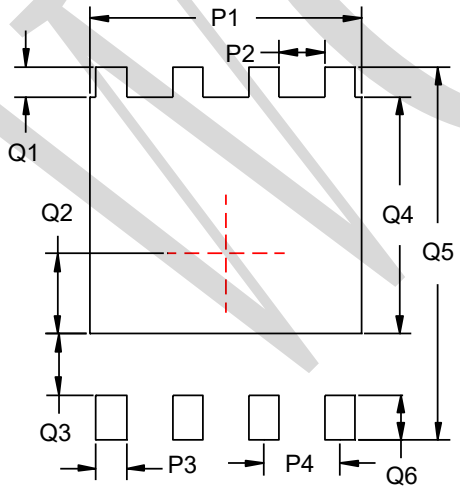


Side View

PDFN5x6 mechanical data

UNIT		A	B	C	D	E	F	G	H	I	J	K
mm	min	4.90	4.8	5.90	5.66	0.60	3.90	3.30	0.53	1.27	0.9	0.254
	max	5.55	5.4	6.35	6.06		4.32	3.92	0.76		1.2	
mil	min	192.9	188.9	232.3	222.8	23.6	153.5	129.9	20.8	50.0	35.4	10.0
	max	218.5	212.6	250.0	238.6		170.1	154.3	29.9		47.2	

PDFN5x6 Suggested Pad Layout



UNIT		P1	P2	P3	P4	Q1
mm	min	4.52	0.76	0.51	1.27	0.50
mil	min	177.9	29.9	20.07	50.0	20.0

UNIT		Q2	Q3	Q4	Q5	Q6
mm	min	1.34	1.02	3.97	6.25	0.76
mil	min	52.75	40.15	156.30	246.06	29.92