

Silicon N-Channel Power MOSFET

Description

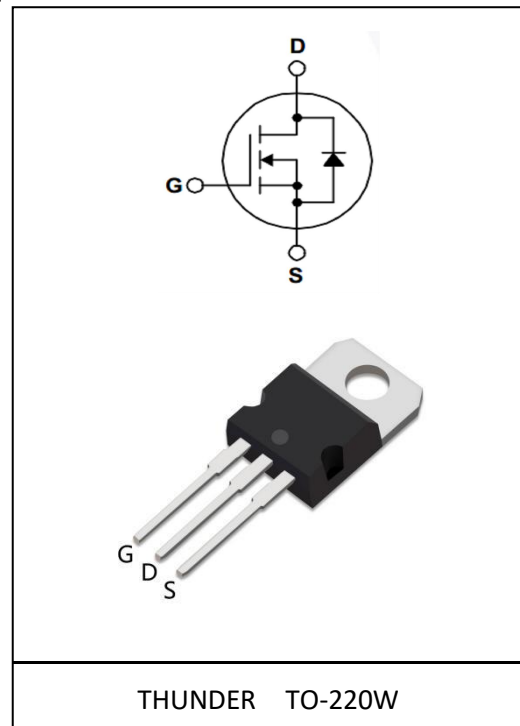
The TH50N06TW uses advanced trench technology and design to provide Excellent $R_{DS(ON)}$. It can be used in a wide variety of applications.

General Features

- $V_{DS}=60V, I_D=50A$
- $R_{DS(on)} \leq 14m\Omega @ V_{GS}=10V$ (Typ:11.0m Ω)
- $R_{DS(on)} \leq 16m\Omega @ V_{GS}=4.5V$ (Typ:12.5m Ω)
- Low ON Resistance
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Application

- Power switching application
- Load switch



Electrical Characteristics @ $T_a=25^\circ C$ (unless otherwise specified)

a) Limited Parameters:

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-to-Source Breakdown Voltage	60	V
I_D	Drain Current (continuous) at $T_c=25^\circ C$	50	A
I_{DM}	Drain Current (pulsed)	200	A
V_{GS}	Gate to Source Voltage	+/-20	V
P_{tot}	Total Dissipation at $T_c=25^\circ C$	100	W
T_j	Max. Operating Junction Temperature	175	$^\circ C$
Eas	Single Pulse Avalanche Energy	256	mj

b) Electrical Parameters:

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{DS}	Drain-source Voltage	$V_{GS}=0V, I_D=250\mu A$	60	66		V
$R_{DS(on)}$	Static Drain-to-Source on-Resistance	$V_{GS}=10V, I_D=25A$		11.0	14	m Ω
		$V_{GS}=4.5V, I_D=15A$		12.5	16	m Ω
$V_{GS(th)}$	Gated Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.3	2.5	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V$			1.0	μA
$I_{GSS(F)}$	Gated Body Leakage Current	$V_{GS}=+20V,$			100	nA
$I_{GSS(R)}$	Gated Body Leakage Current	$V_{GS}=-20V,$			-100	nA
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ $f=1.0MHz$		2200		pF
C_{oss}	Output Capacitance			225		pF
C_{rss}	Reverse Transfer Capacitance			165		pF
Q_g	Total Gate Charge	$V_{DS}=25V$		58		nC
Q_{gs}	Gate-Source Charge	$I_D=10A$		6		nC
Q_{gd}	Gate-Drain Charge	$V_{GS}=10V$		15		nC

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=25V, I_D=10A, R_L=0.3\Omega$ $V_{GS}=10V, R_G=6.8\Omega$		20		nS
t_r	Turn-on Rise Time			90		nS
$t_{d(off)}$	Turn-off Delay Time			45		nS
t_f	Turn-off Fall Time			90		nS

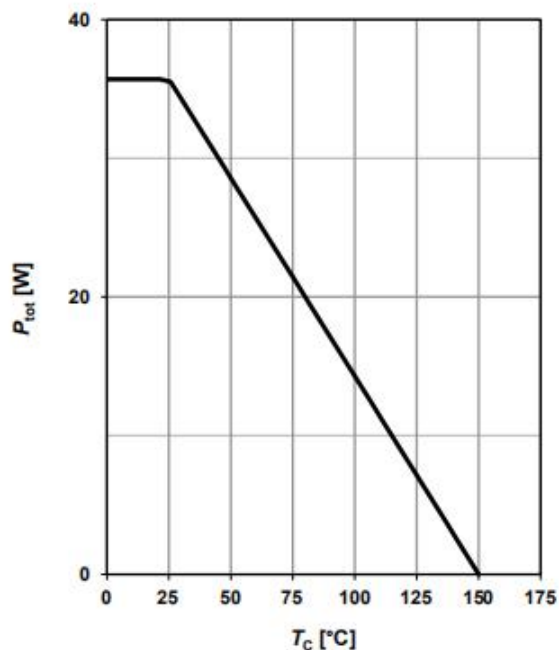
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I _{SD}	S-D Current(Body Diode)			50		A
I _{SDM}	Pulsed S-D Current(Body Diode)			200		A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{DS} =25A			1.4	V
t _{rr}	Reverse Recovery Time	T _J =25℃, I _F =25A di/dt=100A/us		102		nS
Q _{rr}	Reverse Recovery Charge			50		nC
	*Pulse Test: Pulse Width <= 300μs, Duty Cycle< =2%					

Symbol	Parameter	Typ	Unit
$R_{\theta JC}$	Junction-to-Case	1.3	$^\circ C/W$

Typical Characteristics

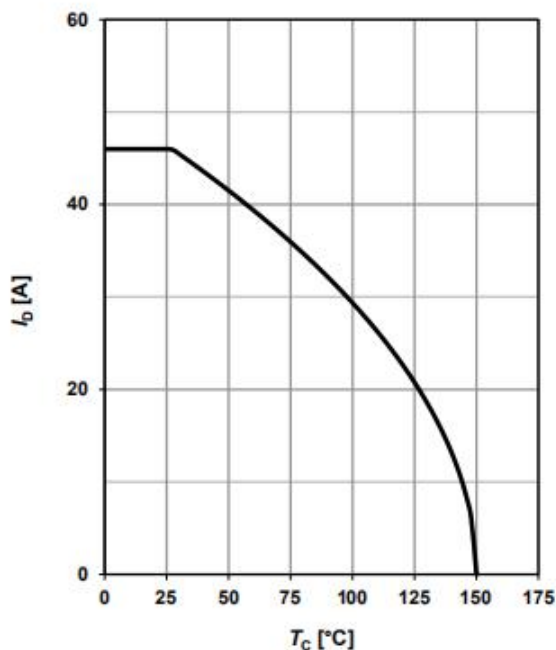
1 Power dissipation

$$P_{\text{tot}} = f(T_C)$$



2 Drain current

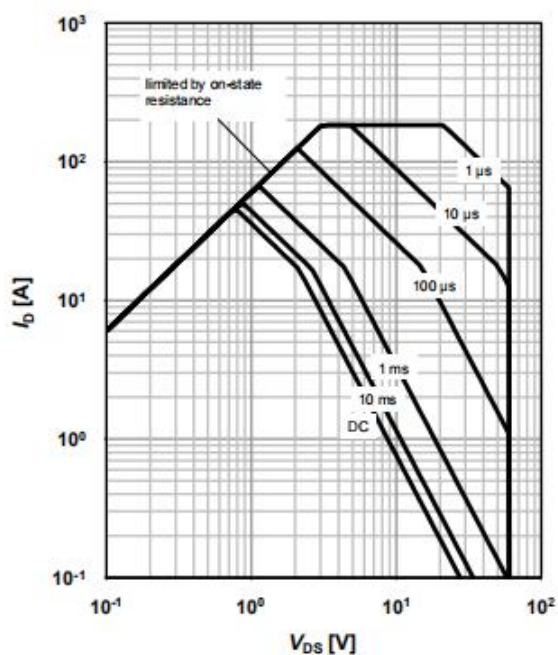
$$I_D = f(T_C); V_{\text{GS}} \geq 10 \text{ V}$$



3 Safe operating area

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

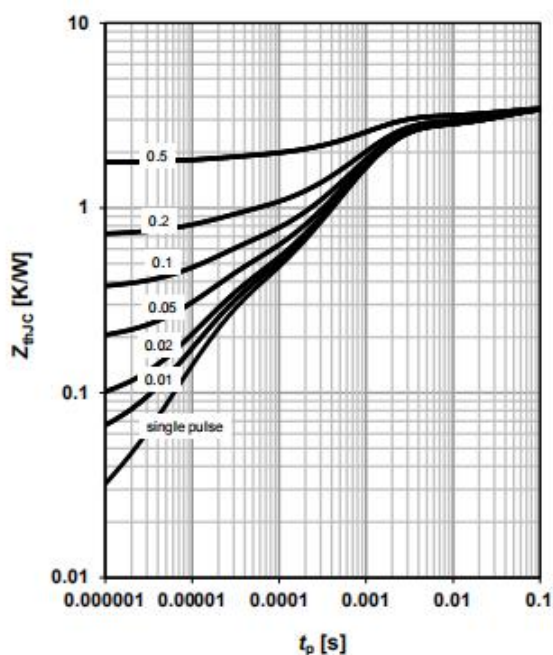
parameter: t_p



4 Max. transient thermal impedance

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

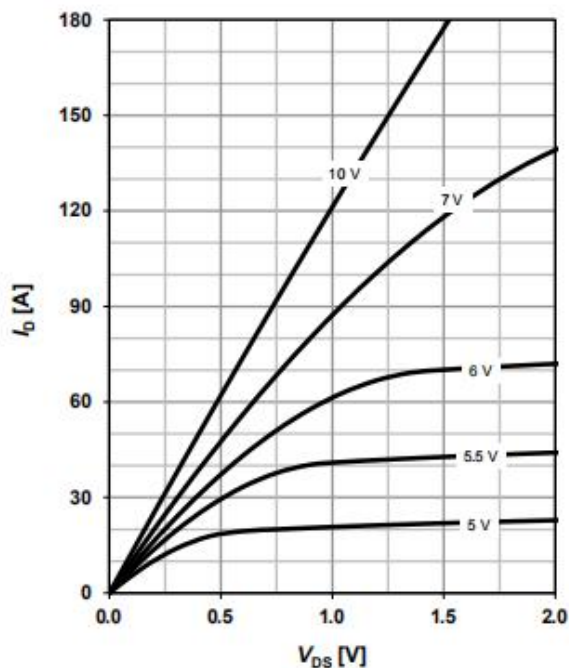
parameter: $D = t_p/T$



5 Typ. output characteristics

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

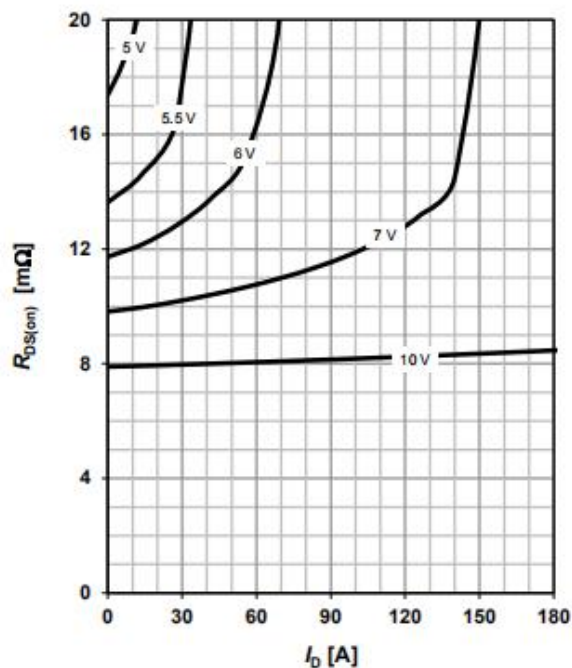
parameter: V_{GS}



6 Typ. drain-source on resistance

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

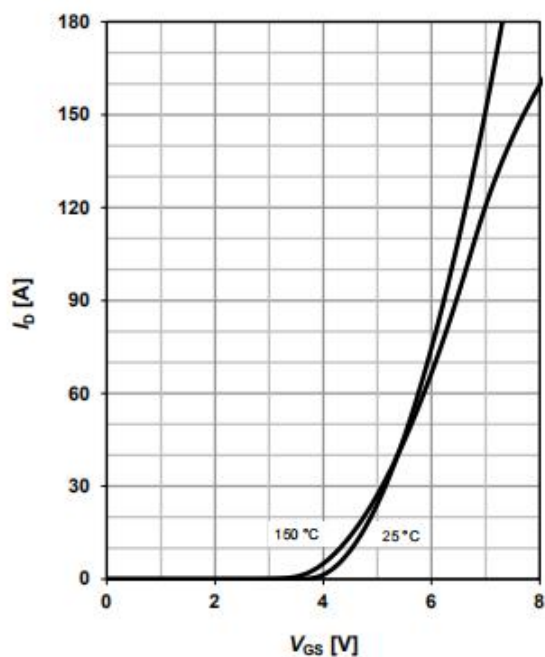
parameter: V_{GS}



7 Typ. transfer characteristics

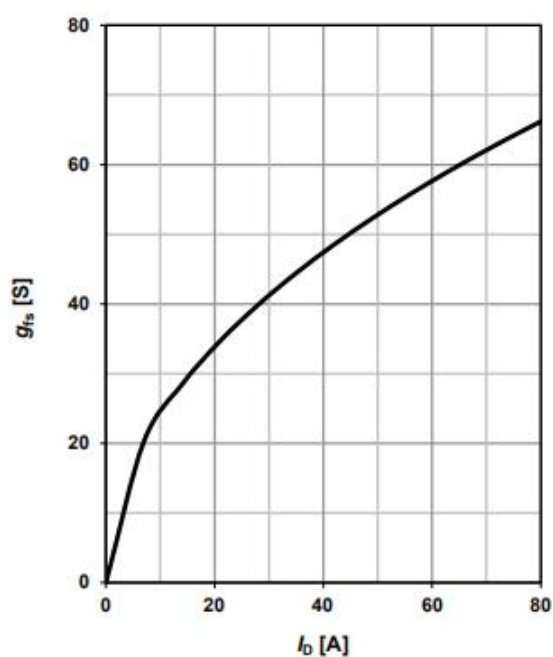
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_J



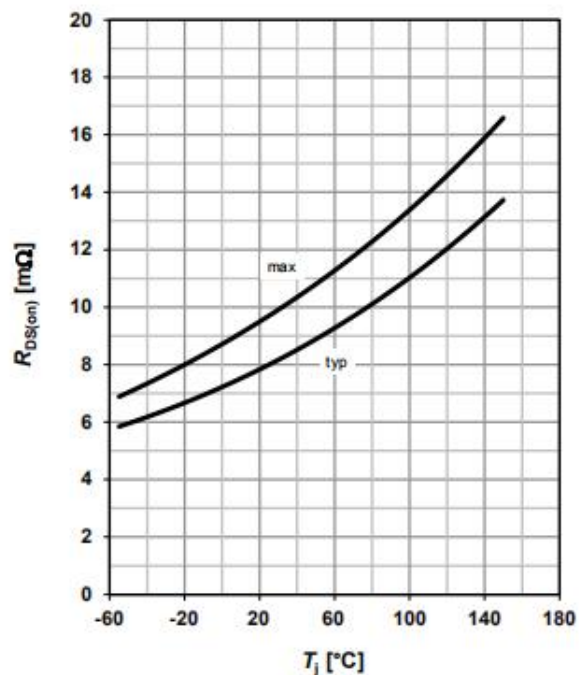
8 Typ. forward transconductance

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



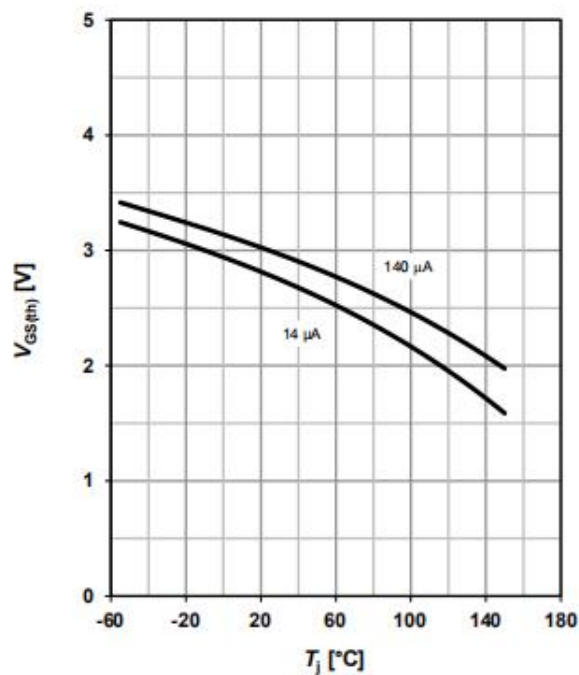
9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_J); I_D = 40 \text{ A}; V_{GS} = 10 \text{ V}$$



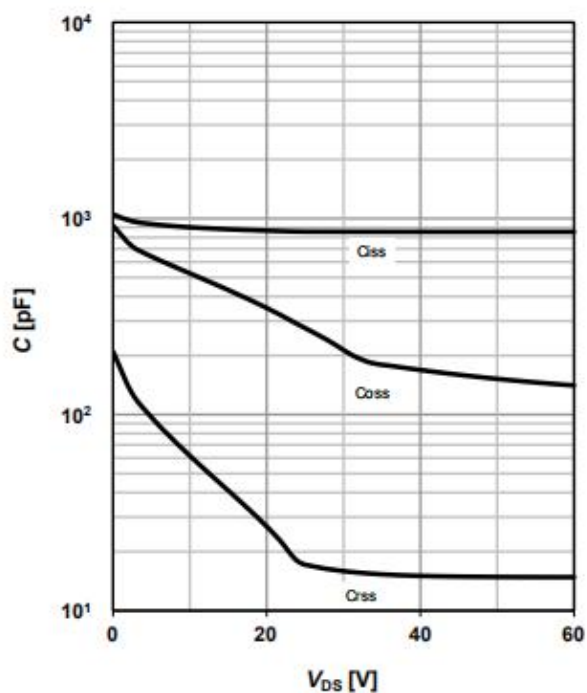
10 Typ. gate threshold voltage

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



11 Typ. capacitances

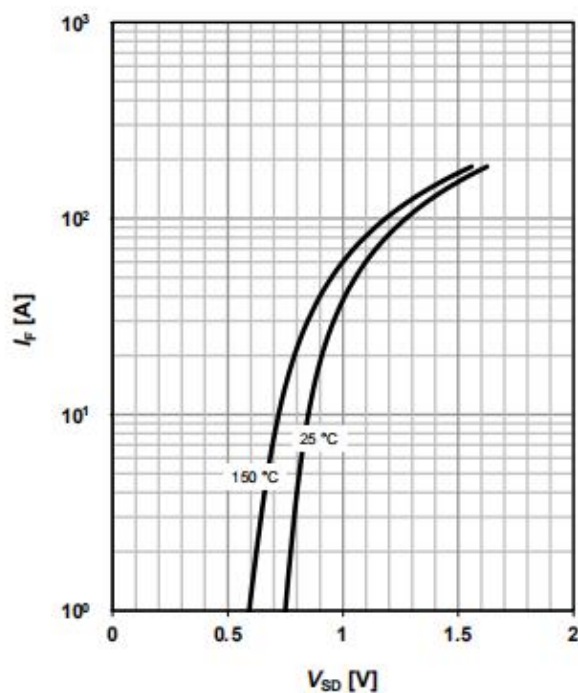
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



12 Forward characteristics of reverse diode

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

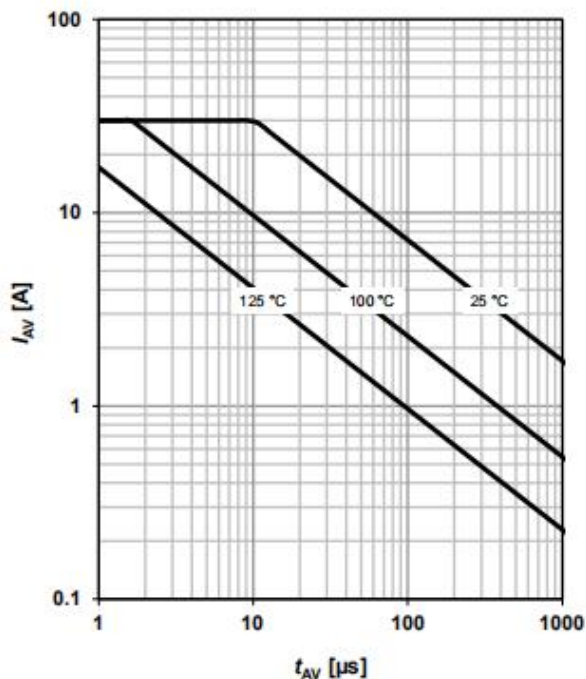
parameter: T_J



13 Avalanche characteristics

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

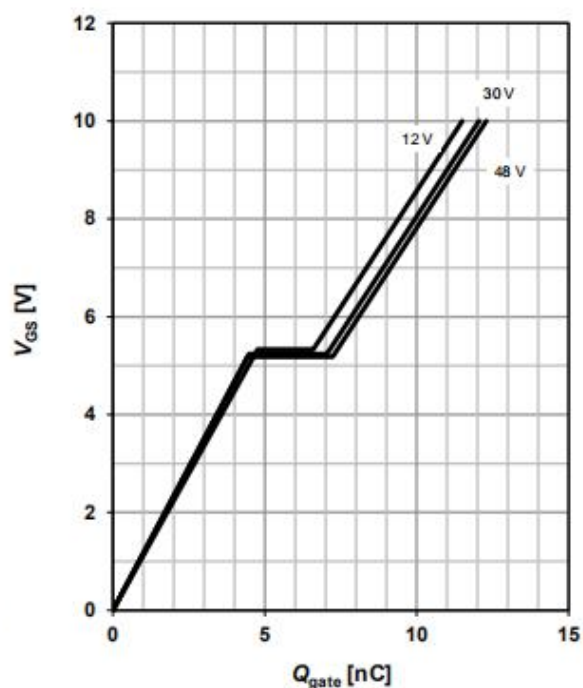
parameter: $T_{j(\text{start})}$



14 Typ. gate charge

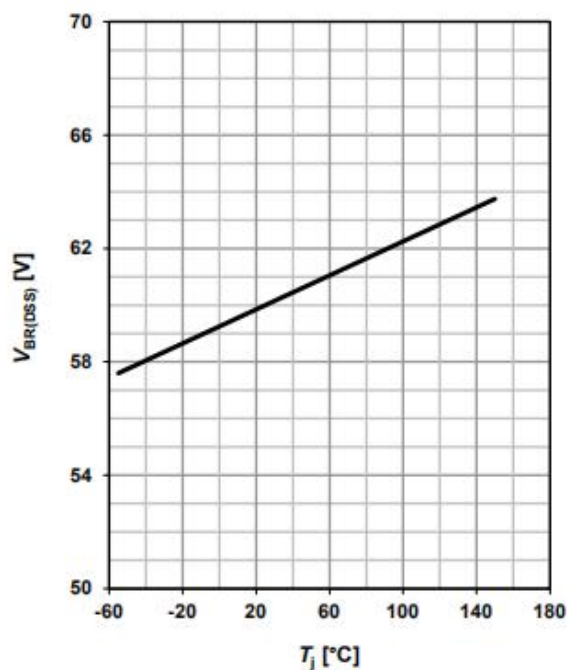
$$V_{GS}=f(Q_{\text{gate}}); I_D=40\ \text{A pulsed}$$

parameter: V_{DD}

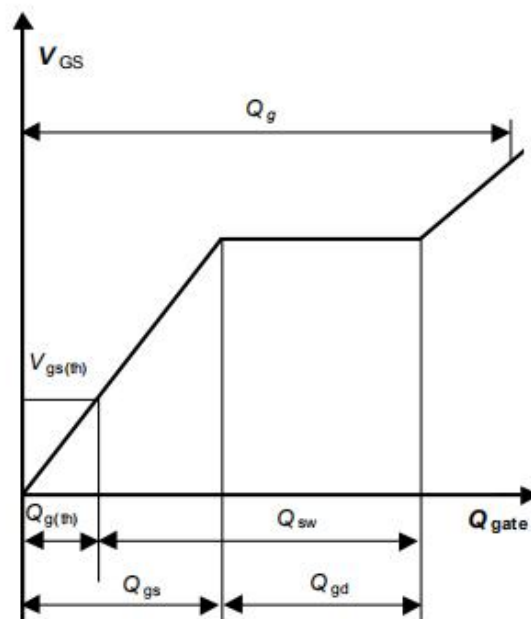


15 Drain-source breakdown voltage

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



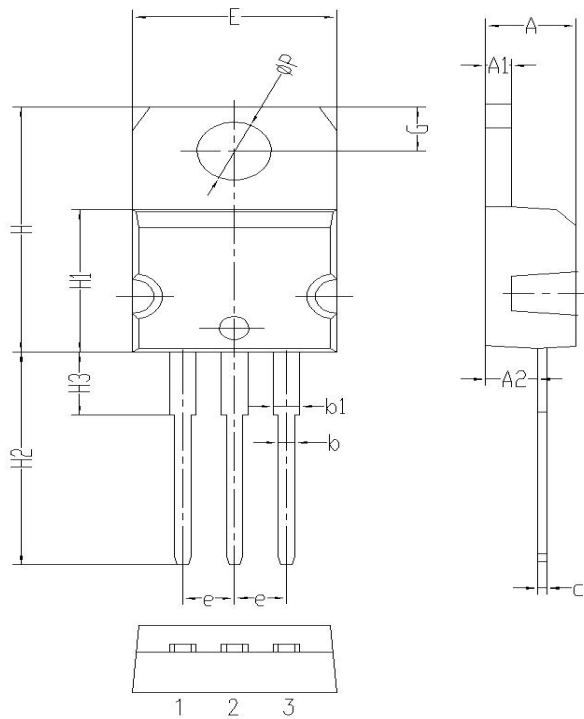
16 Gate charge waveforms



Package Information

TO-220W PACKAGE

基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.05	4.25	4.45
A1	1.2	1.3	1.4
A2	2.35	2.45	2.55
b	0.60	0.8	1.00
b1	1.10	1.30	1.50
c	0.35	0.45	0.55
e	2.34	2.54	2.74
E	9.8	10.0	10.2
H	15.1	15.3	15.5
H1	8.70	8.90	9.10
H2	13.0	13.5	14.0
H3	3.65	3.85	4.05
G	2.60	2.8	3.00
ΦP	3.60	3.8	4.00

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