

• General Description

The AGM1030MA combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

This device is ideal for load switch and battery protection applications.

• Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance
- 100% Avalanche tested
- 100% DVDS tested

• Application

- MB/VGA Vcore
- SMPS 2nd Synchronous Rectifier
- POL application
- BLDC Motor driver

Product Summary

BVDSS	RDSON	ID
100V	25mΩ	20A
-100V	95mΩ	-15A

PDFN5*6 Pin Configuration

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM1030MA	AGM1030MA	PDFN5*6	330mm	12mm	3000

Table 1. Absolute Maximum Ratings (TA=25°C)

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	100	-100	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	±20	±20	V
	Drain Current-Continuous($T_c=25^\circ C$) (Note 1)	20	-15	A
	Drain Current-Continuous($T_c=100^\circ C$)	13	-10	A
IDM (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 2)	80	-60	A
P_d	Total Power Dissipation($T_c=25^\circ C$)	50	69	W
	Total Power Dissipation($T_c=100^\circ C$)	20	27.8	W
EAS	Avalanche energy (Note 3)	30	56	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	°C

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) ¹	64	75	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	2.5	1.8	°C/W

Table 3. N- Channel Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	100	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=100V,VGS=0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=250μA	1.2	--	2.2	V
gFS	Forward Transconductance	VDS=5V,ID=8A	--	4	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=10A	--	25	32	mΩ
		VGS=4.5V, ID=8A	--	30.5	38	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=50V,VGS=0V, F=1MHZ	--	445	--	pF
Coss	Output Capacitance		--	171	--	pF
Crss	Reverse Transfer Capacitance		--	3.2	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	--	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=10V,VDS=50V, ID=10, RGEN=5Ω	--	12	--	nS
tr	Turn-on Rise Time		--	15	--	nS
td(off)	Turn-Off Delay Time		--	20	--	nS
tf	Turn-Off Fall Time		--	6.0	--	nS
Qg	Total Gate Charge	VGS=10V, VDS=50V, ID=10A	--	8.0	--	nC
Qgs	Gate-Source Charge		--	1.4	--	nC
Qgd	Gate-Drain Charge		--	1.8	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	20	A
VSD	Forward on Voltage	VGS=0V,IS=10A	--	--	1.2	V
trr	Reverse Recovery Time	IF=10A , dI/dt=100A/μs ,	--	37	--	ns
Qrr	Reverse Recovery Charge	TJ=25°C	--	80	--	nc

Notes 1.The maximum current rating is package limited.

Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T_J=25°C , VDD=50V,Vgs=10V, ID=11A,L=0.5mH,RG=25ohm

Table 3. P-Channel Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=-250μA	-100	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=-100V, VGS=0V	--	--	-1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V, VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=-250μA	-1.2	--	-2.2	V
gFS	Forward Transconductance	VDS=-5V, ID=-3A	--	7	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=-10V, ID=-5A	--	95	140	mΩ
		VGS=-4.5V, ID=-3A	--	126	163	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=-50V, VGS=0V, F=1MHZ	--	700	--	pF
Coss	Output Capacitance		--	56	--	pF
Crss	Reverse Transfer Capacitance		--	8.6	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V, f=1.0MHz	--	--	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=-10V, VDS=-50V, ID=-5A, RGEN=5Ω	--	6.0	--	nS
tr	Turn-on Rise Time		--	3.7	--	nS
td(off)	Turn-Off Delay Time		--	40	--	nS
tf	Turn-Off Fall Time		--	24.5	--	nS
Qg	Total Gate Charge	VGS=-10V, VDS=-50V, ID=-5A	--	12.5	--	nC
Qgs	Gate-Source Charge		--	2.0	--	nC
Qgd	Gate-Drain Charge		--	2.2	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	-15	A
VSD	Forward on Voltage	VGS=0V, IS=-5A	--	--	-1.2	V
trr	Reverse Recovery Time	IF=-5A , di/dt=100A/μs , TJ=25°C	--	66	--	ns
Qrr	Reverse Recovery Charge		--	214	--	nc

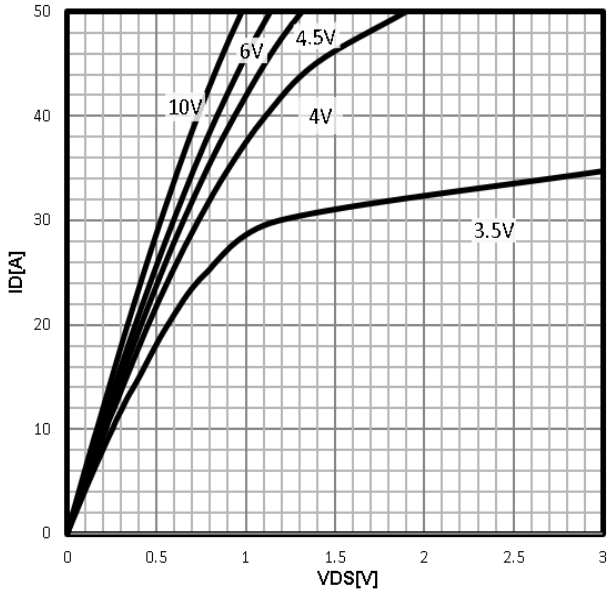
Notes 1. The maximum current rating is package limited.

Notes 2. Repetitive Rating: Pulse width limited by maximum junction temperature

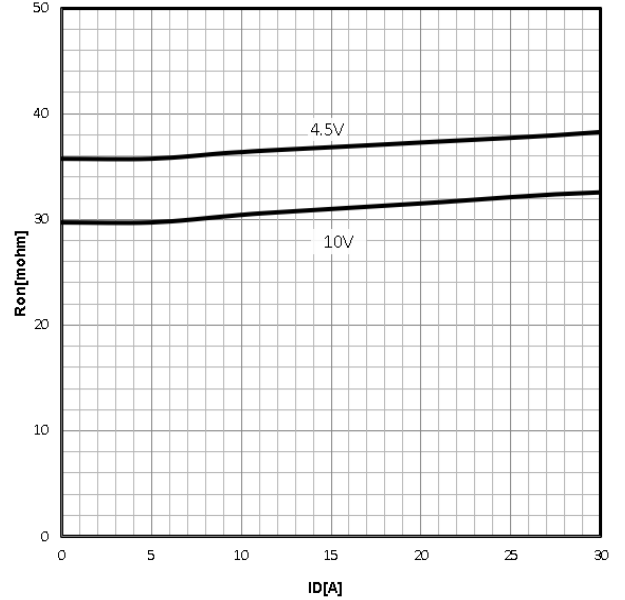
Notes 3. EAS condition: T_J=25°C, VDD=-50V, Vgs=-10V, ID=-15A, L=0.5mH, RG=25ohm

N-Channel Characteristics Curve:

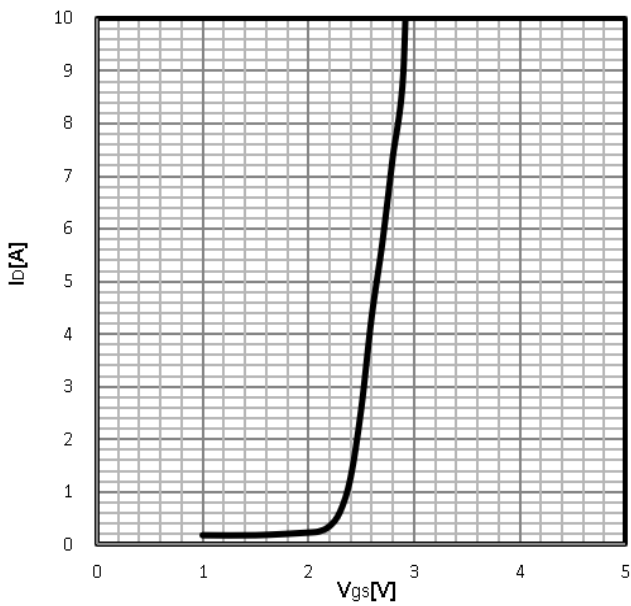
Typ. output characteristics
 $I_D = f(V_{DS})$



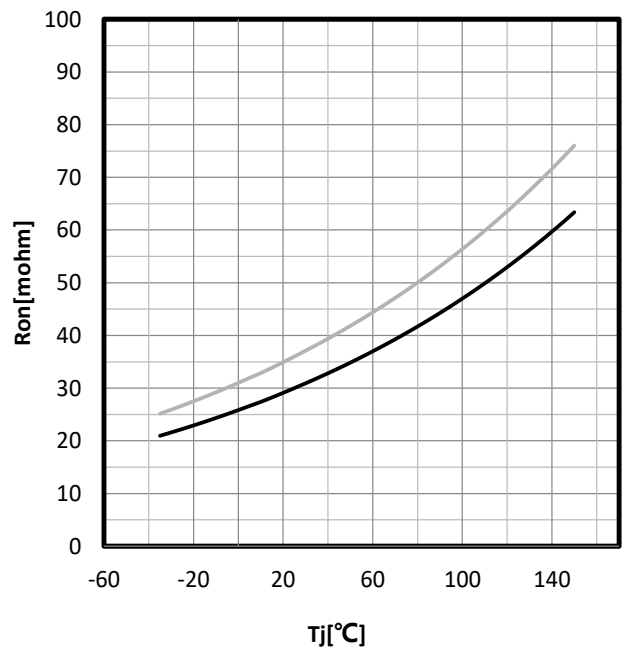
Typ. drain-source on resistance
 $R_{DS(on)} = f(I_D)$



Typ. transfer characteristics
 $I_D = f(V_{GS})$

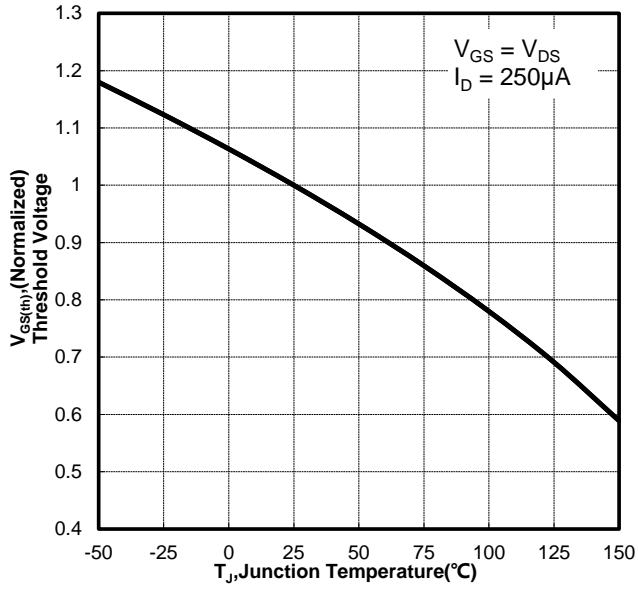


Drain-source on-state resistance
 $R_{DS(on)} = f(T_j); I_D = 10A; V_{GS} = 10V$

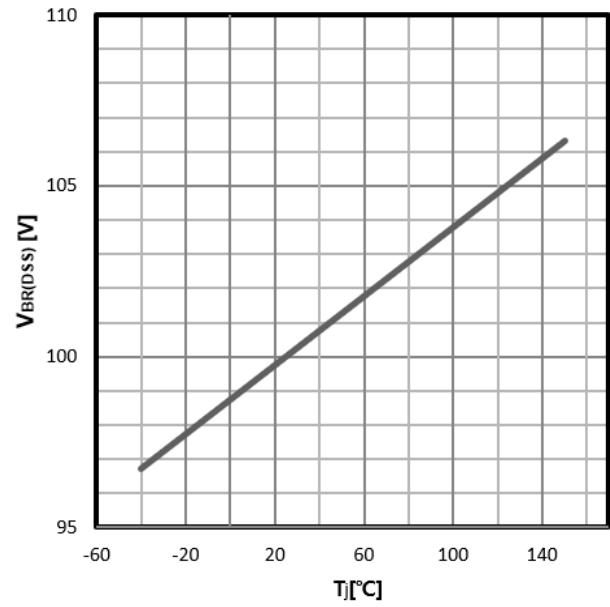


Gate Threshold Voltage

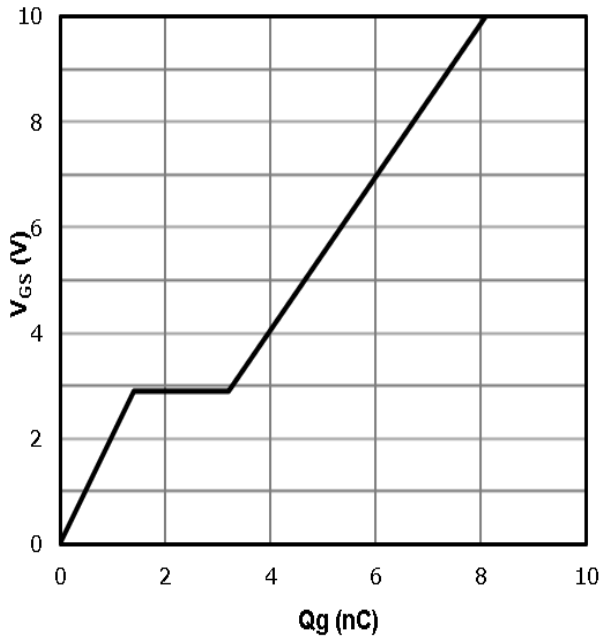
$$V_{TH} = f(T_j); I_D = 250\mu A$$


Drain-source breakdown voltage

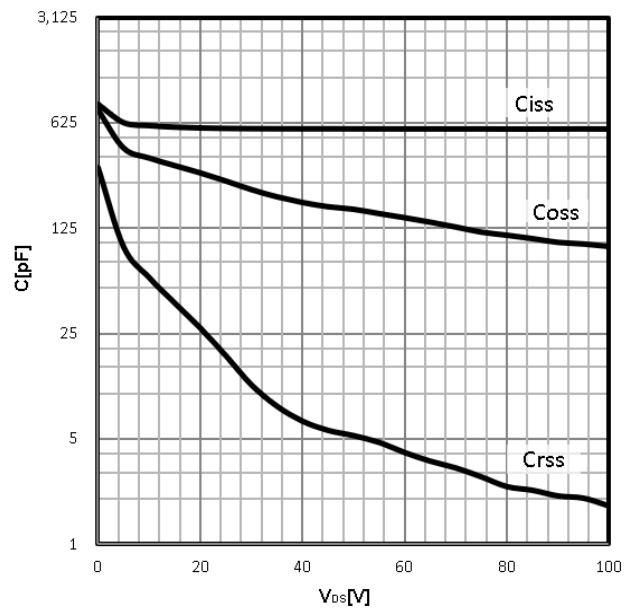
$$V_{BR(DSS)} = f(T_j); I_D = 250\mu A$$


Typ. gate charge

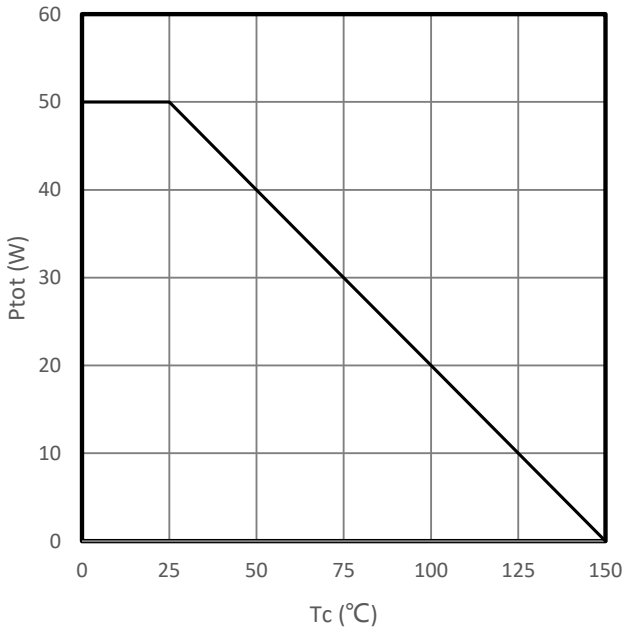
$$V_{GS} = f(Q_g); I_D = 10A$$


Typ. capacitances

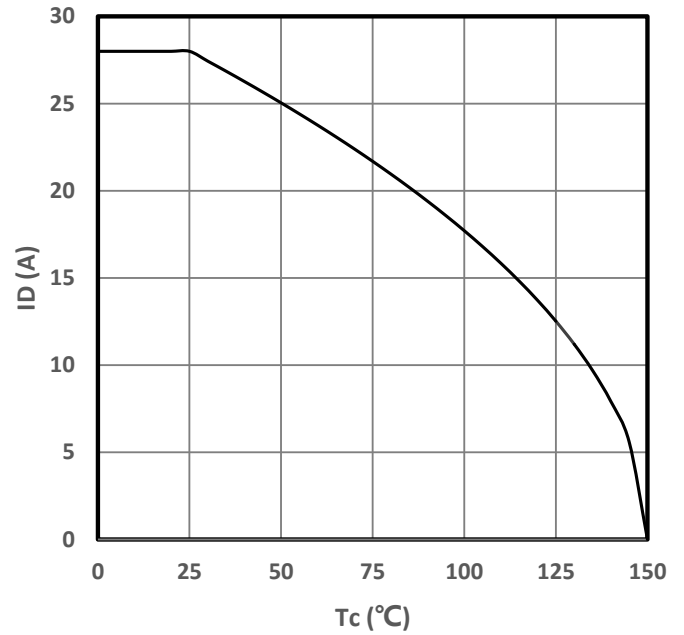
$$C = f(V_{DS}); V_{GS} = 0V; f = 1MHz$$



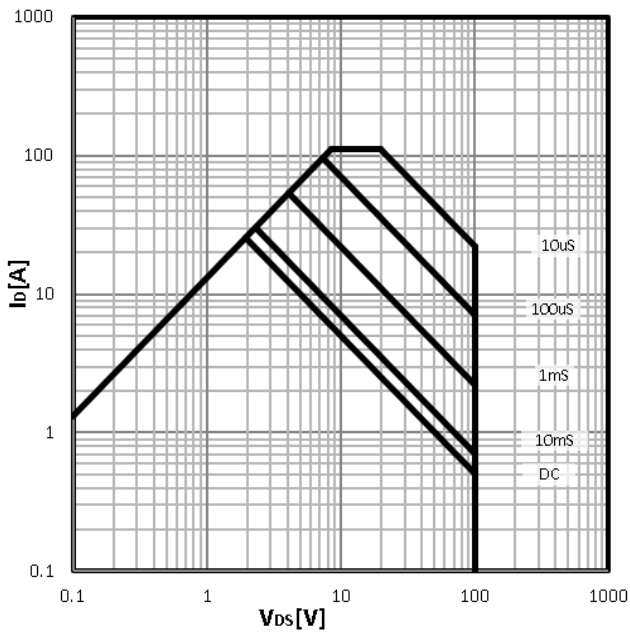
Power Dissipation
 $P_{tot}=f(T_c)$



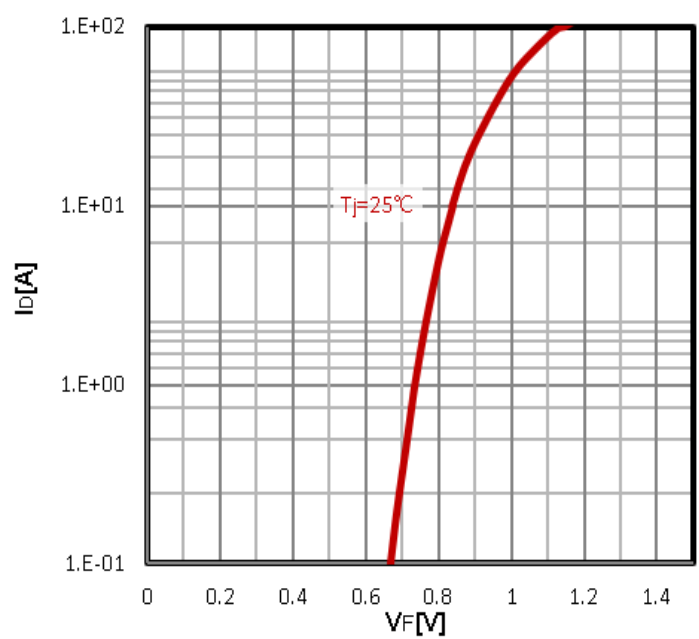
Maximum Drain Current
 $I_D=f(T_c)$



Safe operating area
 $I_D=f(V_{DS})$

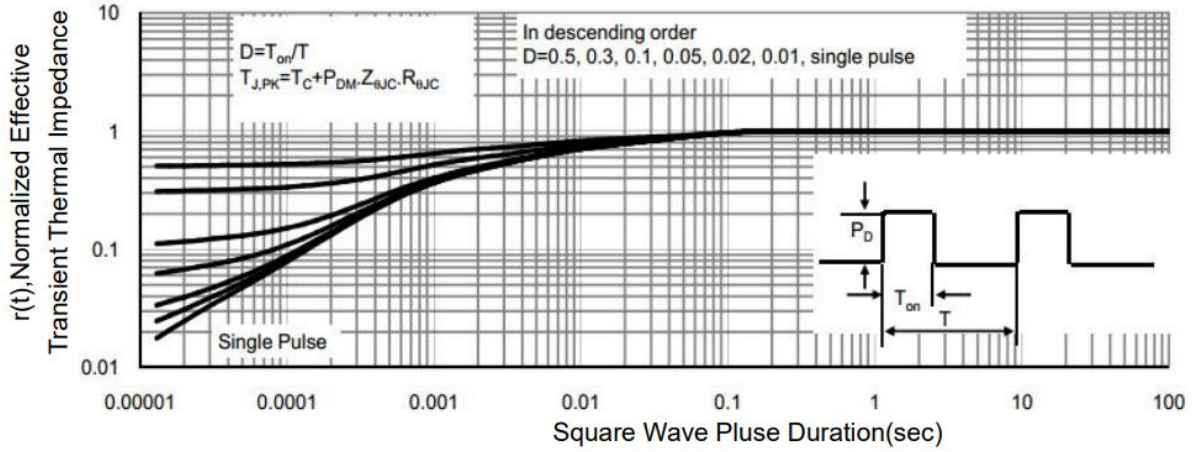


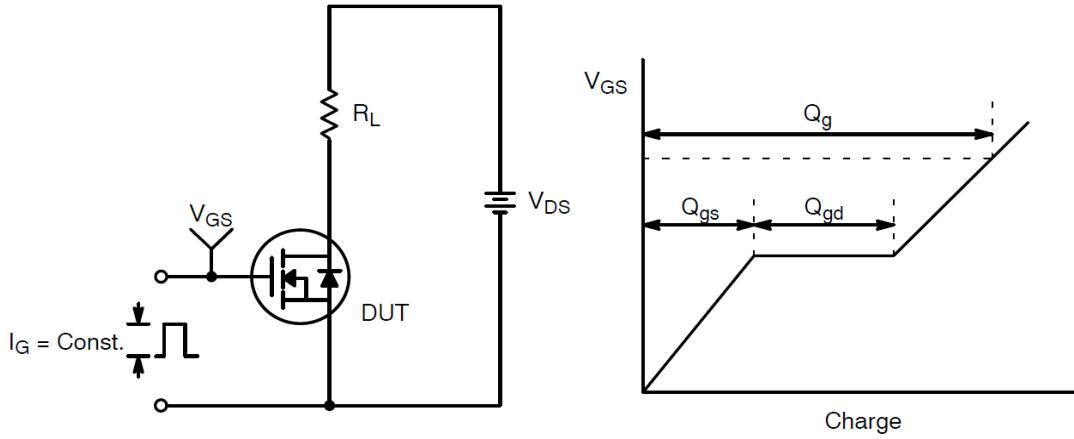
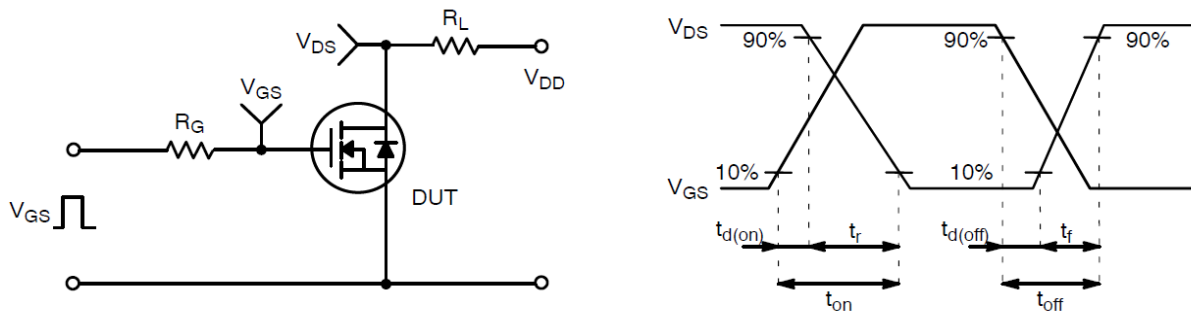
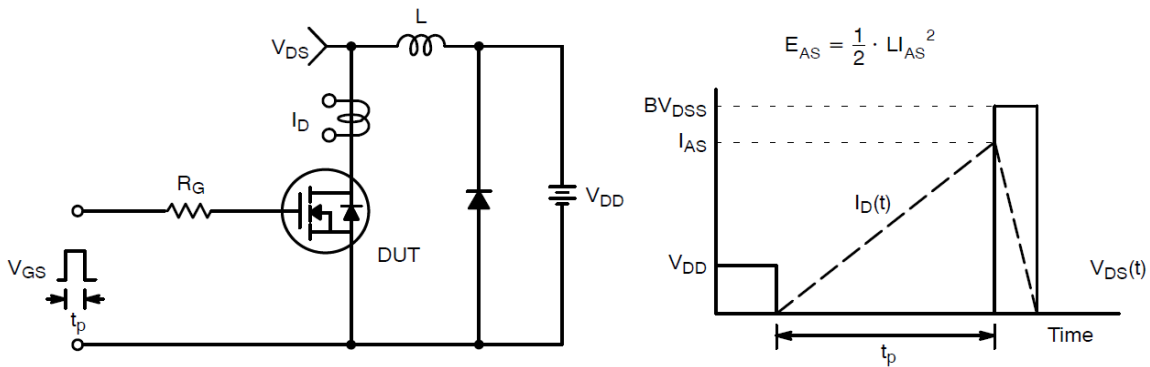
Body Diode Forward Voltage Variation
 $I_F=f(V_{GS})$



Max. transient thermal impedance

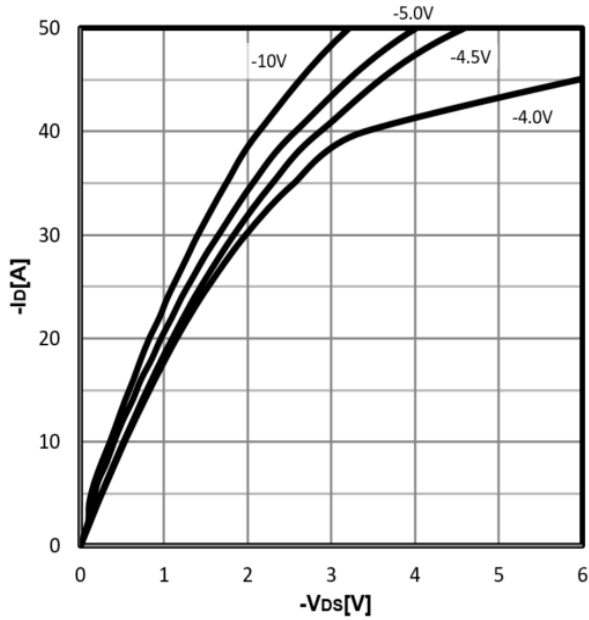
$$Z_{thJC} = f(t_p)$$



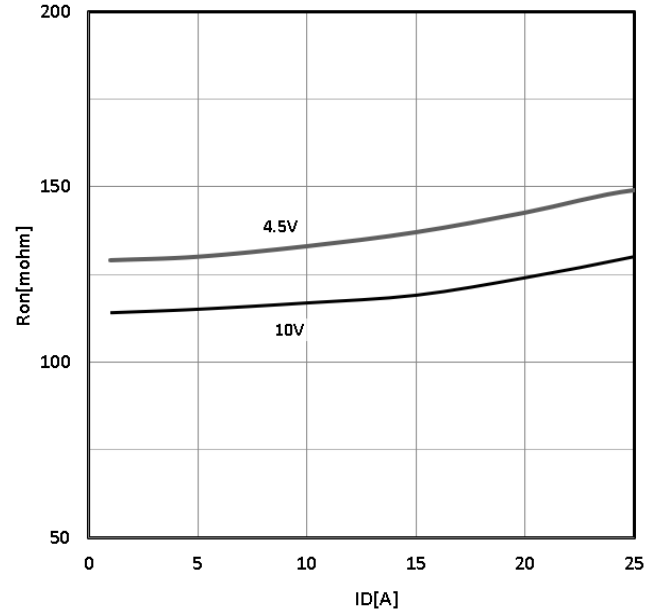
Test Circuit and Waveform:

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching Test Circuit & Waveforms

P-Channel Characteristics Curve:

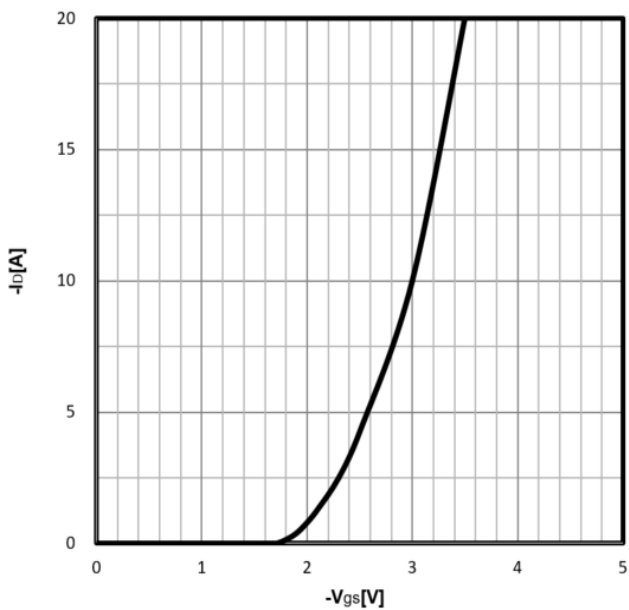
Typ. output characteristics
 $-I_D = f(-V_{DS})$



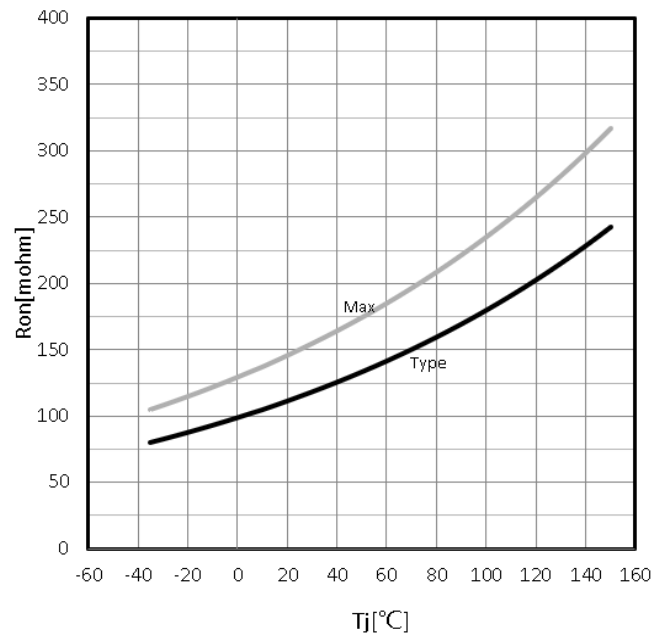
Typ. drain-source on resistance
 $R_{DS(on)} = f(-I_D)$



Typ. transfer characteristics
 $-I_D = f(-V_{GS})$

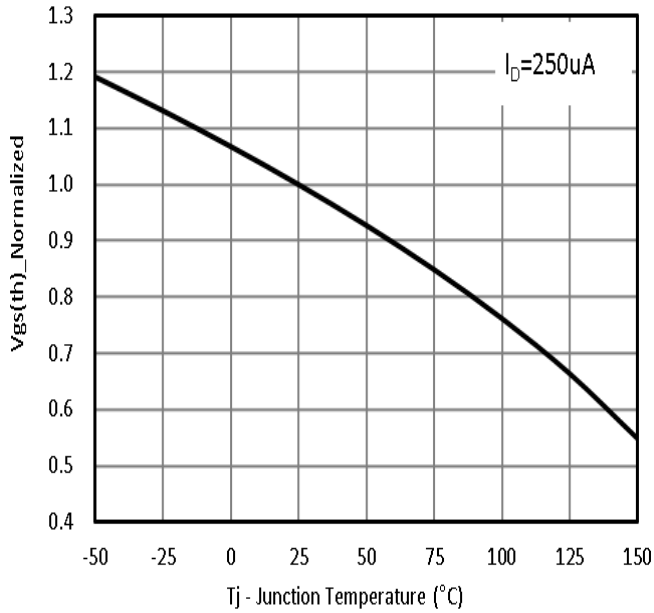


Drain-source on-state resistance
 $R_{DS(on)} = f(T_j); I_D = -5A; V_{GS} = -10V$

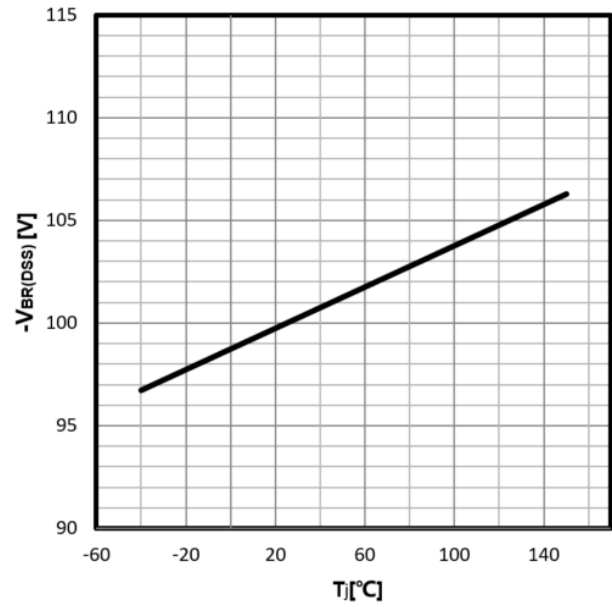


Gate Threshold Voltage

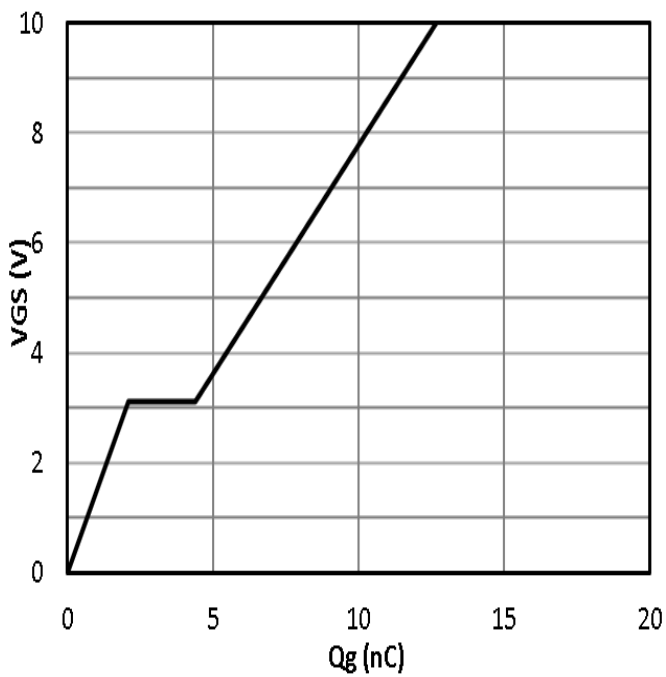
$$-V_{TH} = f(T_j); I_D = -250\mu A$$


Drain-source breakdown voltage

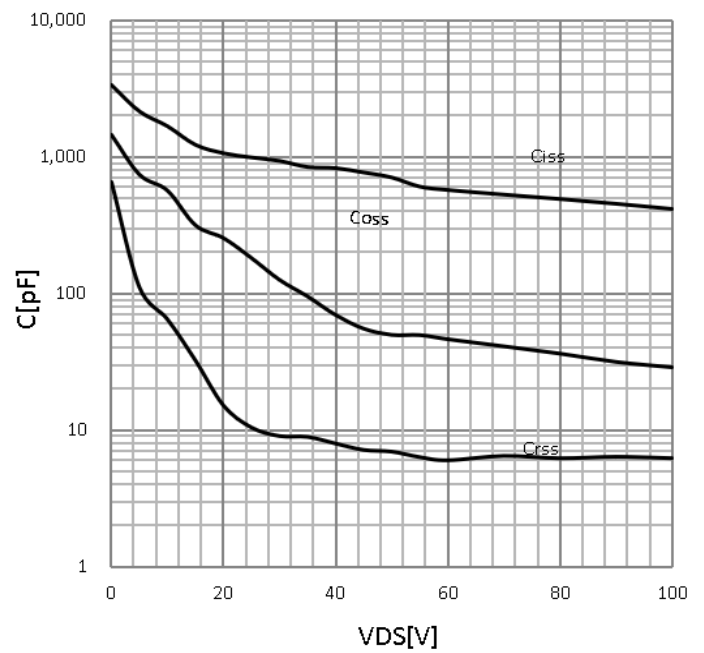
$$-V_{BR(DSS)} = f(T_j); I_D = -250\mu A$$


Typ. gate charge

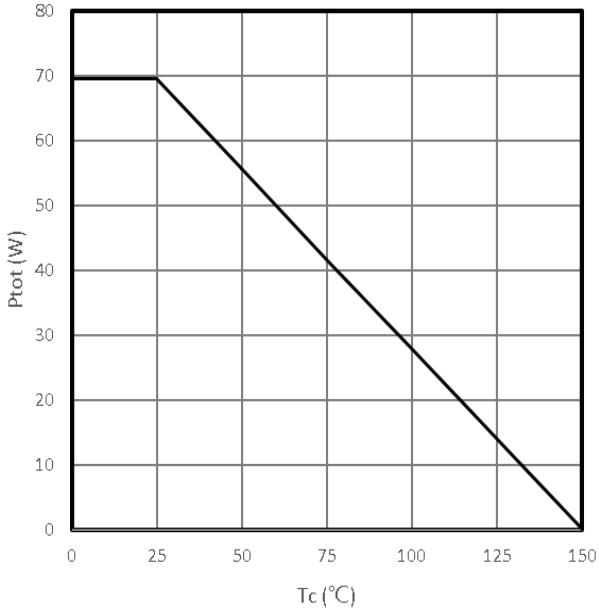
$$-V_{GS} = f(Q_g); I_D = -5A$$


Typ. capacitances

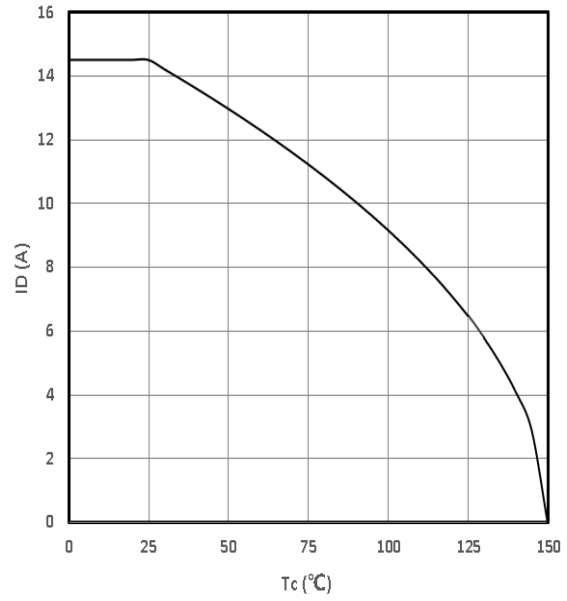
$$C = f(-V_{DS}); V_{GS} = 0V; f = 1MHz$$



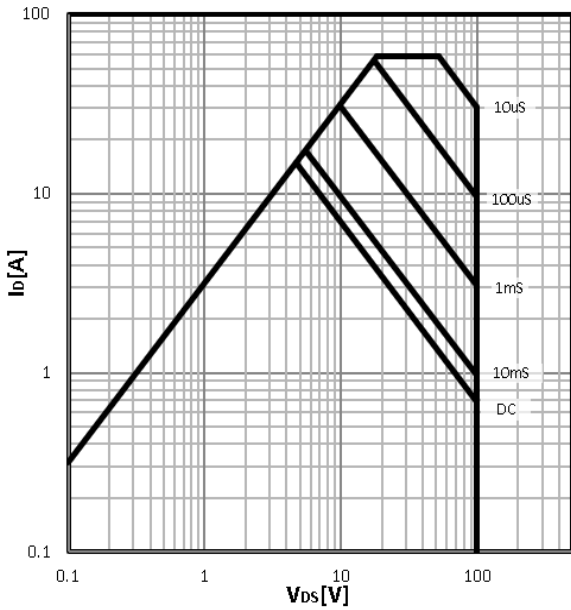
Power Dissipation
 $P_{tot}=f(T_C)$



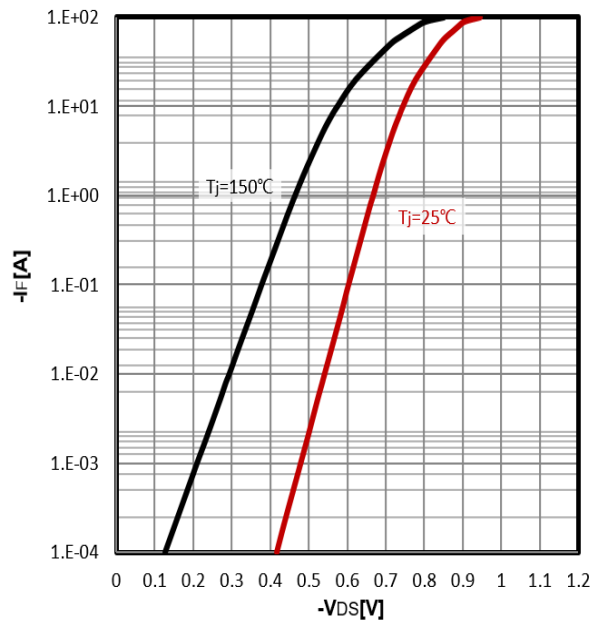
Maximum Drain Current
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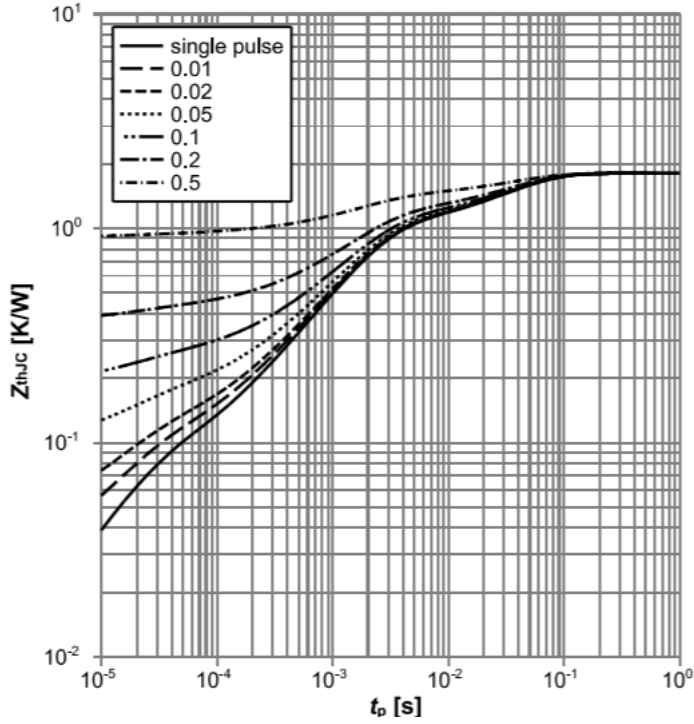
Safe operating area
 $-I_D=f(-V_{DS})$

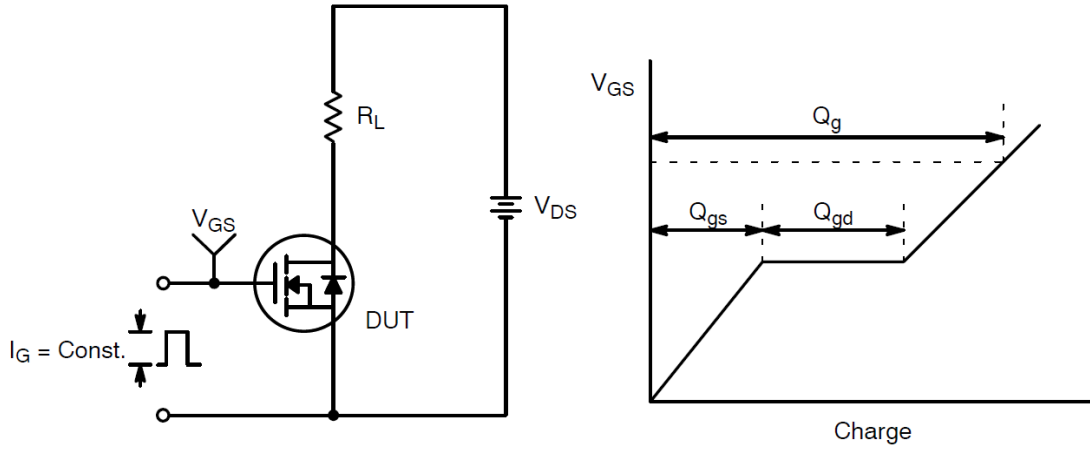
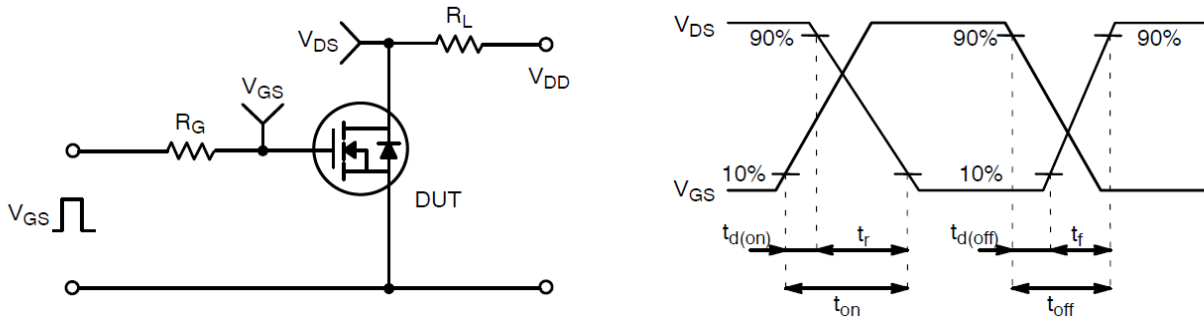
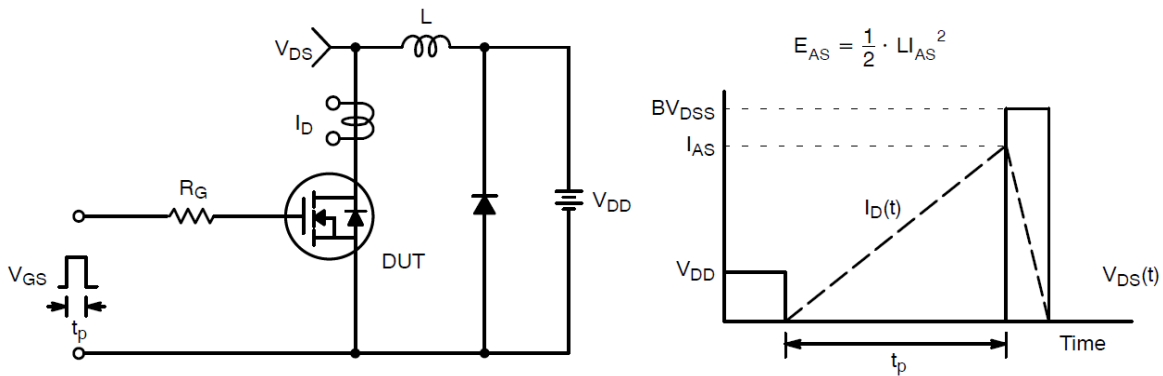


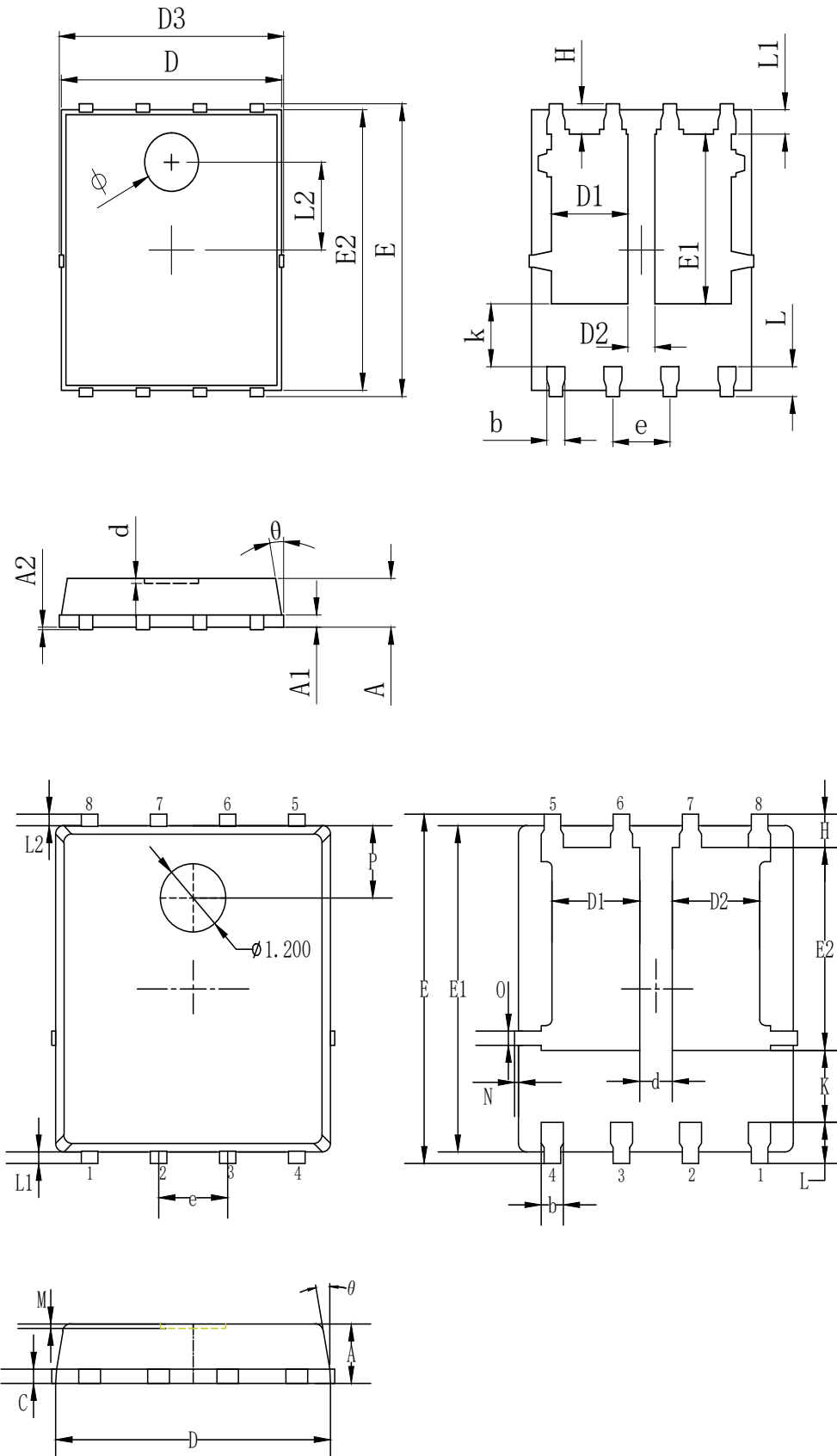
Body Diode Forward Voltage Variation
 $-I_F=f(-V_{DS})$



Max. transient thermal impedance
 $Z_{thJC} = f(t_p)$



Test Circuit and Waveform:

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching Test Circuit & Waveforms

●Dimensions (PDFN5*6)


SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	0.900	1.000	1.100
A1	0.254 REF.		
A2	0 [~] 0.05		
D	4.824	4.900	4.976
D1	1.605	1.705	1.805
D2	0.500	0.600	0.700
D3	4.924	5.000	5.076
E	5.924	6.000	6.076
E1	3.375	3.475	3.575
E2	5.674	5.750	5.826
b	0.350	0.400	0.450
e	1.270 TYP.		
L	0.534	0.610	0.686
L1	0.424	0.500	0.576
L2	1.800 REF.		
k	1.190	1.290	1.390
H	0.549	0.625	0.701
θ	8°	10°	12°
ϕ	1.100	1.200	1.300
d			0.100

Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.35	0.40	0.50
C	0.20	0.25	0.35
D	4.90	5.05	5.20
D1/D2	1.51	1.61	1.71
d	0.50	0.60	0.70
E	6.00	6.15	6.30
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.74	0.84
L1/L2	0.20 REF.		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		


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