XPT1H13A4

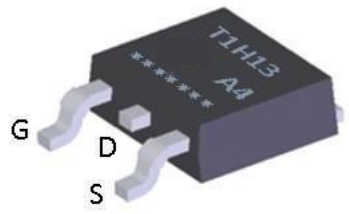
Silicon N-Channel Power MOSFET

General Description:

The XPT1H13A4 uses super trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications. The package form is TO-252, which accords with the ROHS standard and Halogen Free standard.

V_{DSS}	100	V
I_D	55	A
P_D	96	W
$R_{DS(ON)}$ TYPE	10.5	mΩ

Marking and Pin Assignment



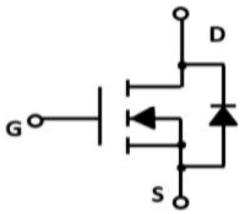
Features:

- Fast Switching
- Low Gate Charge and $R_{DS(ON)}$
- Low Reverse transfer capacitances

Applications:

- DC-DC converter
- Portable Equipment
- Power management

Inner Equivalent Principium Chart



100% DVDS Tested

100% Avalanche Tested

RoHS HF

Package Marking and Ordering Information:

Marking	Part #	Package	Packing	Qty.
T1H13	XPT1H13A4	TO-252	Reel	2500 units

Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		100	V
I_D	Continuous Drain Current	T_C = 25 ℃	55	A
	Continuous Drain Current	T_C = 100 ℃	35	A
I_{DM}[a1]	Pulsed Drain Current		210	A
E_{AS}[a2]	Single pulse avalanche energy		150	mJ
V_{GS}	Gate-to-Source Voltage		±20	V
P_D	Power Dissipation		96	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range		150，–55 to 150	℃
T_L	Maximum Temperature for Soldering		260	℃

Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.3	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	94	℃/W

Electrical Characteristics（TA= 25℃ unless otherwise specified）:

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	100	--	--	V
I_{DSS}	Drain to Source Leakage Current	V_{DS}=100V, V_{GS}=0V	--	--	1	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS}=+20V, V_{DS}=0V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS}=-20V, V_{DS}=0V	--	--	-100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1.3	1.8	2.3	V
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=10V, I_D=20A	--	10.5	13	mΩ

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 50V f = 1.0MHz	--	1200	--	pF
C_{oss}	Output Capacitance		--	462	--	
C_{rss}	Reverse Transfer Capacitance		--	8.7	--	
R_g	Gate resistance	V_{GS}=0V,V_{DS} Open	--	11.5	--	Ω

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Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D=10A V_{DS} = 50V V_{GS} = 10V R_G = 5Ω	--	16	--	ns
tr	Rise Time		--	18	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	32	--	
t_f	Fall Time		--	10	--	
Q_g	Total Gate Charge	V_{GS} =10V V_{DS} = 50V I_D =10A	--	21.8	--	nC
Q_{gs}	Gate Source Charge		--	3.72	--	
Q_{gd}	Gate Drain Charge		--	4.97	--	

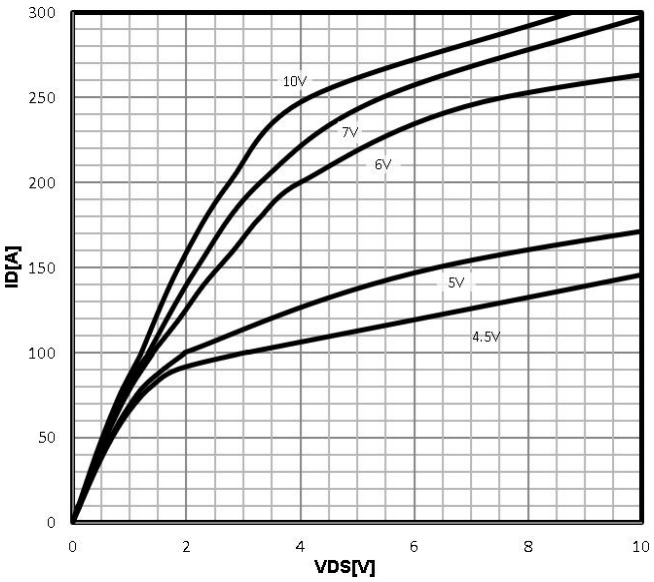
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Value
			Min.	Typ.	Max.	
I_S	Diode Forward Current	T_C =25 °C	--	--	55	A
V_{SD}	Diode Forward Voltage	I_S=10A, V_{GS}=0V	--	--	1.2	V
t_{rr}	Reverse Recovery time	I_S=10A, V_{DD}=50V dI/dt=100A/μs	--	43	--	ns
Q_{rr}	Reverse Recovery Charge		--	90	--	nC

[a1]: Repetitive rating; pulse width limited by maximum junction temperature

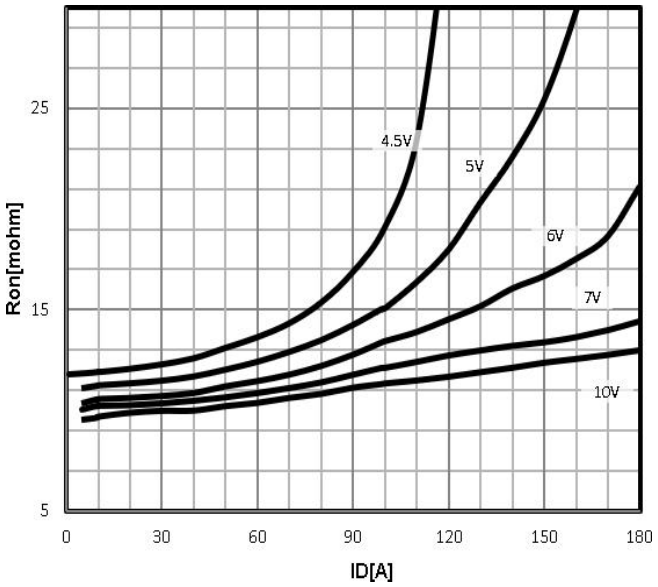
[a2]: VDD=50V, L=0.5mH, Rg=25Ω, Starting TJ=25 ℃

Characteristics Curve：

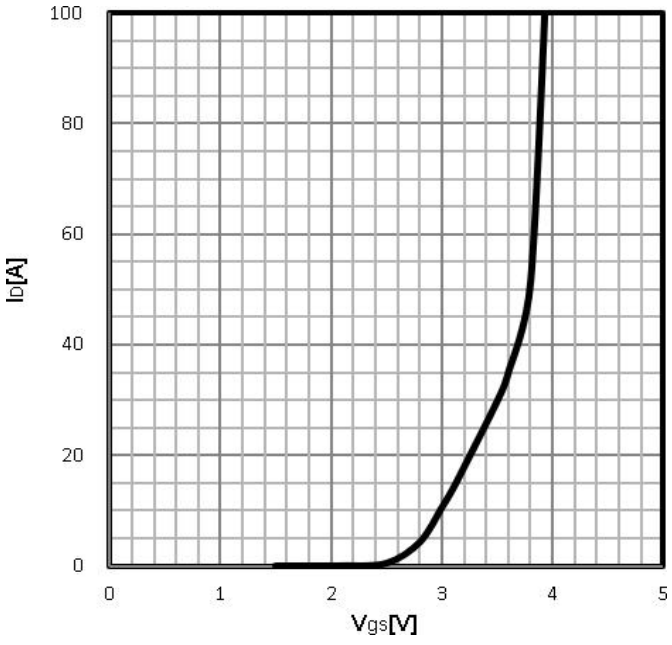
Typ. output characteristics
$I_D=f(V_{DS})$



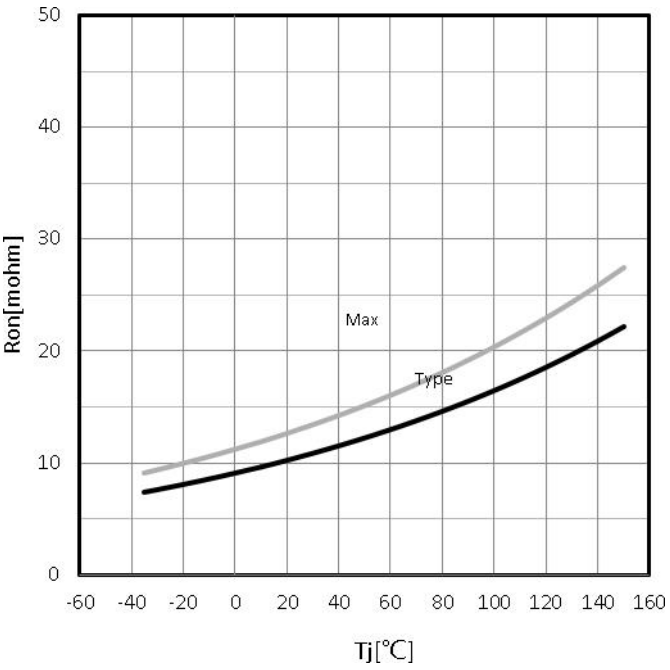
Typ. drain-source on resistance
$R_{DS(on)}=f(I_D)$



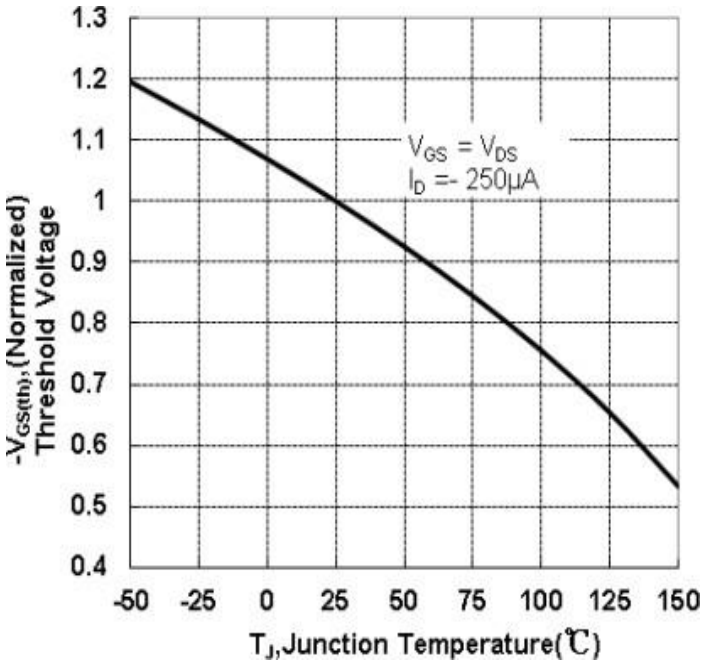
Typ. transfer characteristics
$I_D=f(V_{GS})$



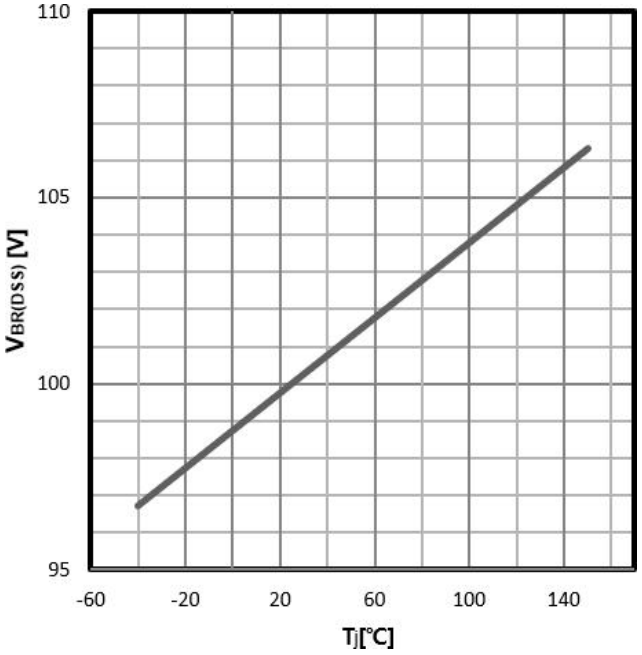
Drain-source on-state resistance
$R_{DS(on)}=f(T_j)$;I_D=20A; V_{GS}=10V



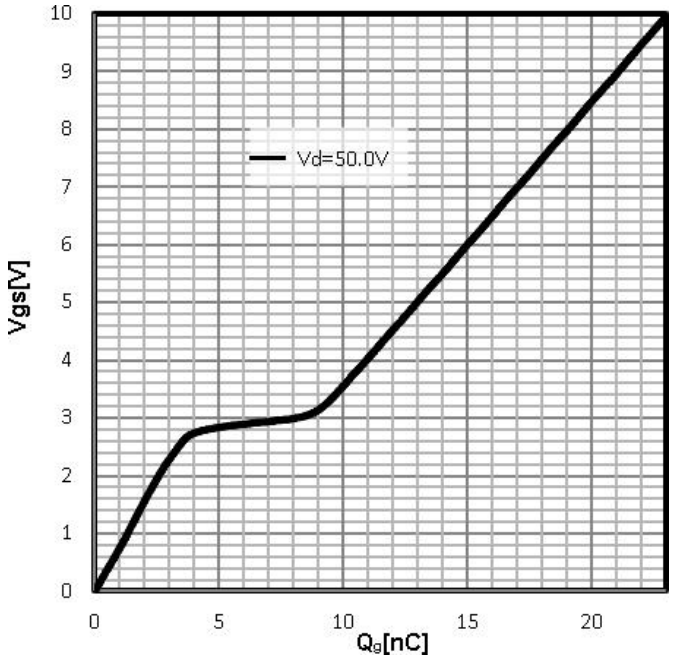
Gate Threshold Voltage
$V_{TH}=f(T_j)$; I_D=250uA



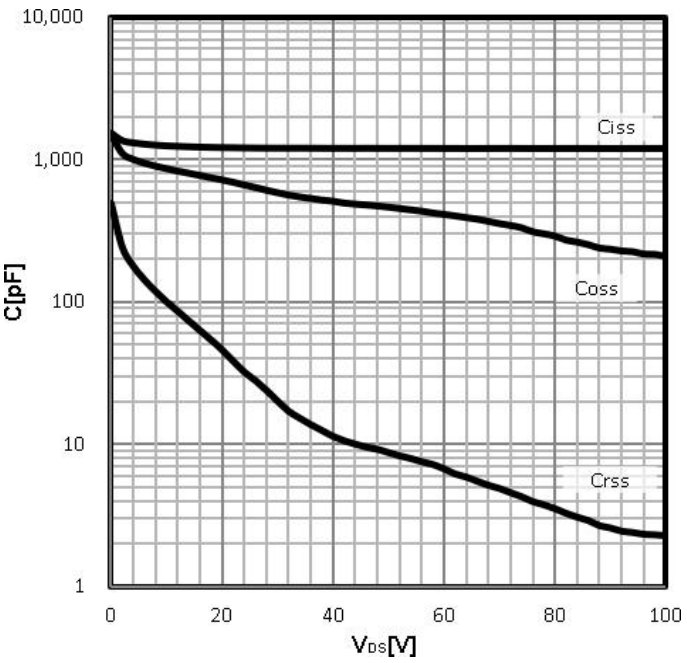
Drain-source breakdown voltage
$V_{BR(DSS)}=f(T_j)$; I_D=250uA



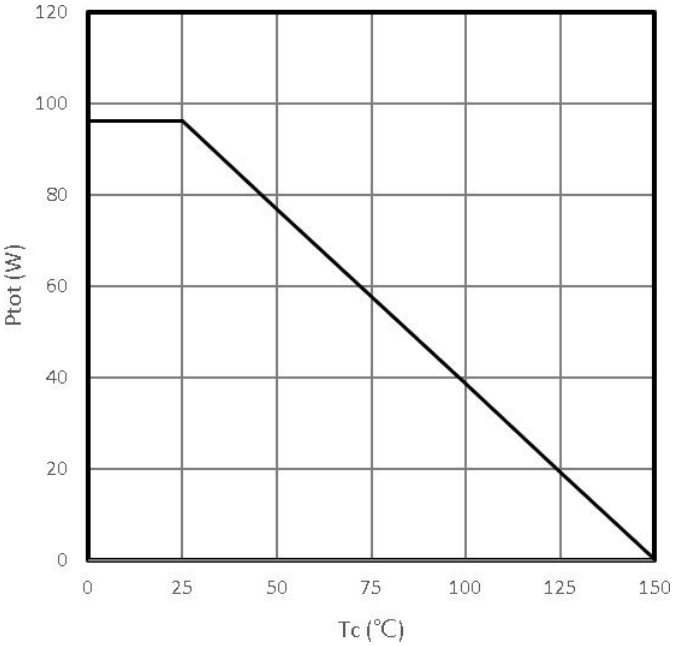
Typ. gate charge
$V_{GS}=f(Q_g)$; I_D=10A



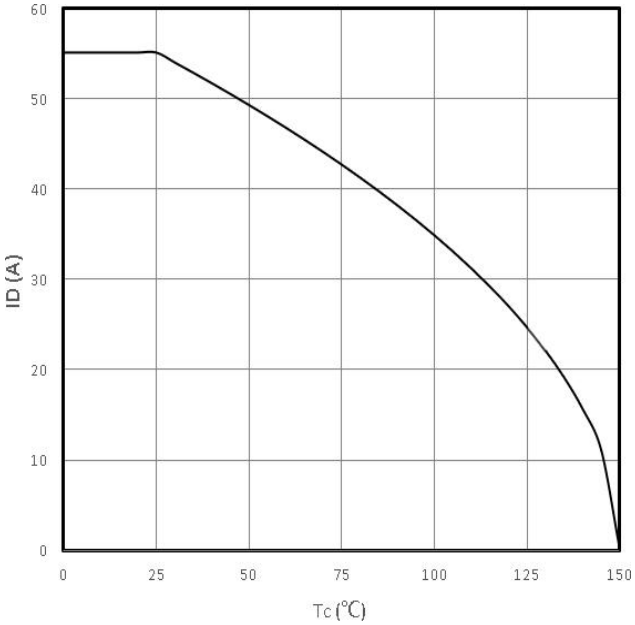
Typ. capacitances
C =f(V_{DS}); V_{GS}=0V; f =1MHz



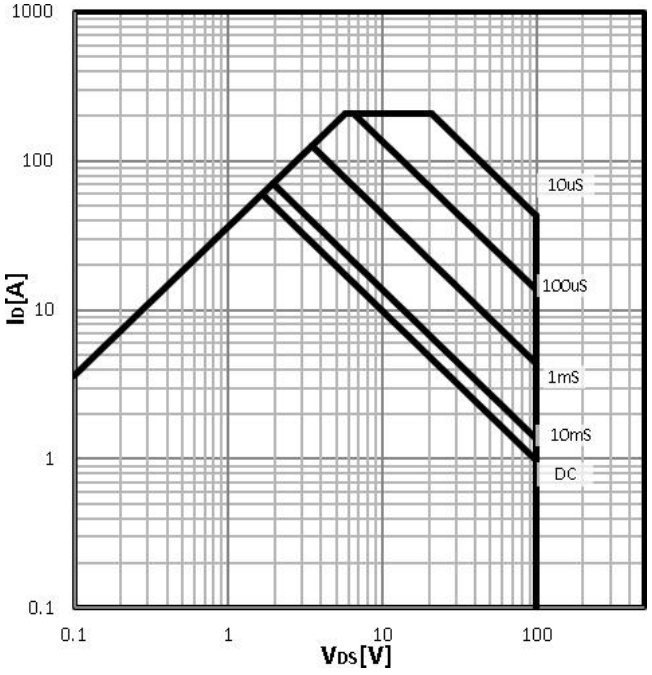
Power Dissipation
$P_{tot}=f(T_C)$



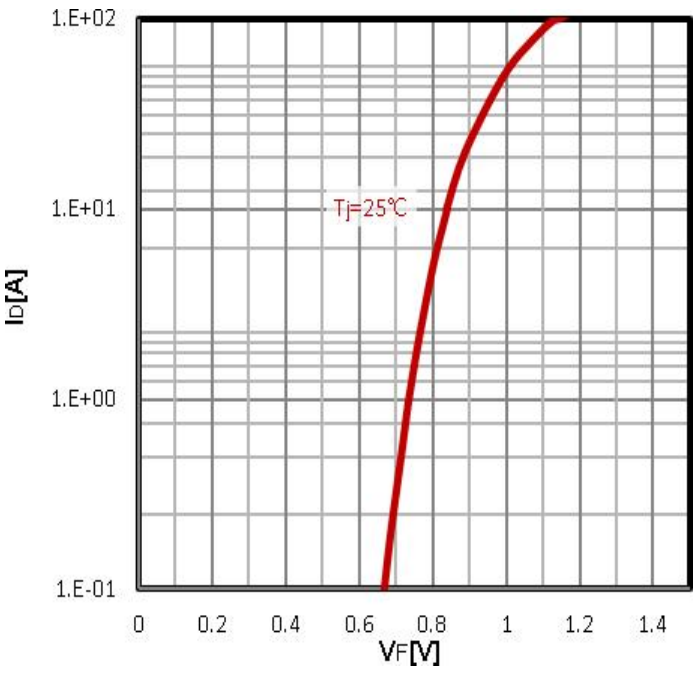
Maximum Drain Current
$I_D=f(T_C)$



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

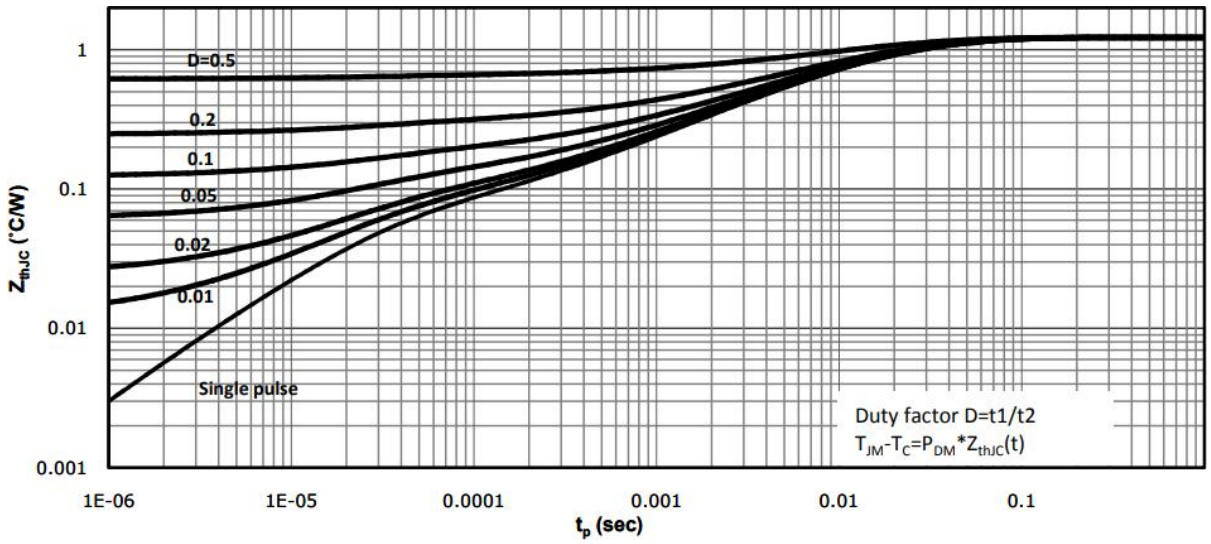


Body Diode Forward Voltage Variation
$I_F=f(V_{GS})$

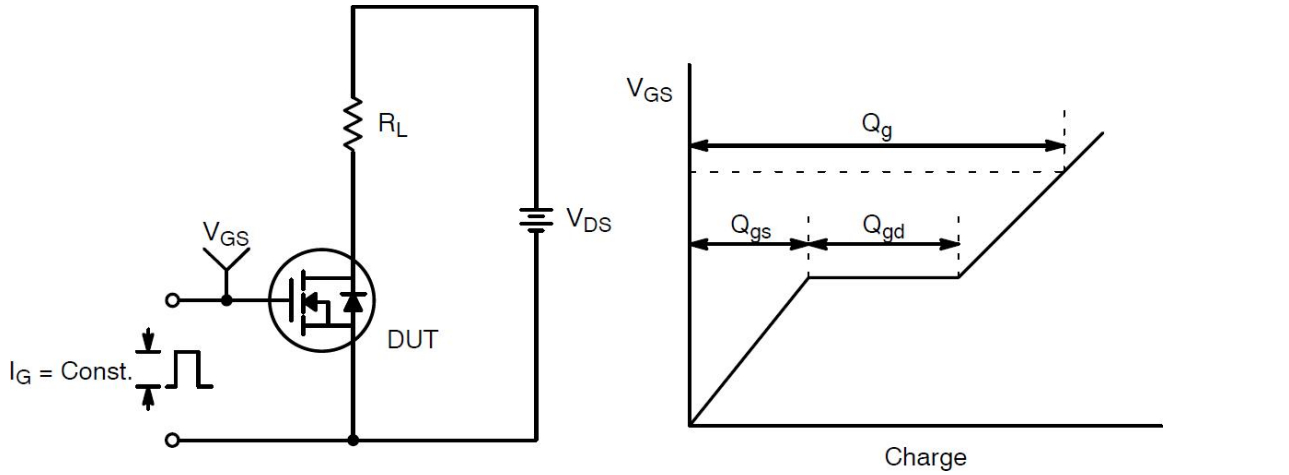


Max. transient thermal impedance

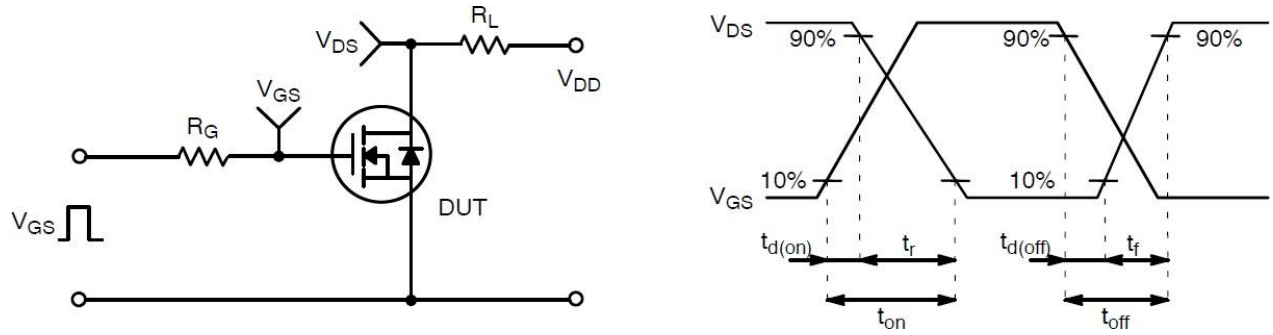
$Z_{thJC}=f(t_p)$



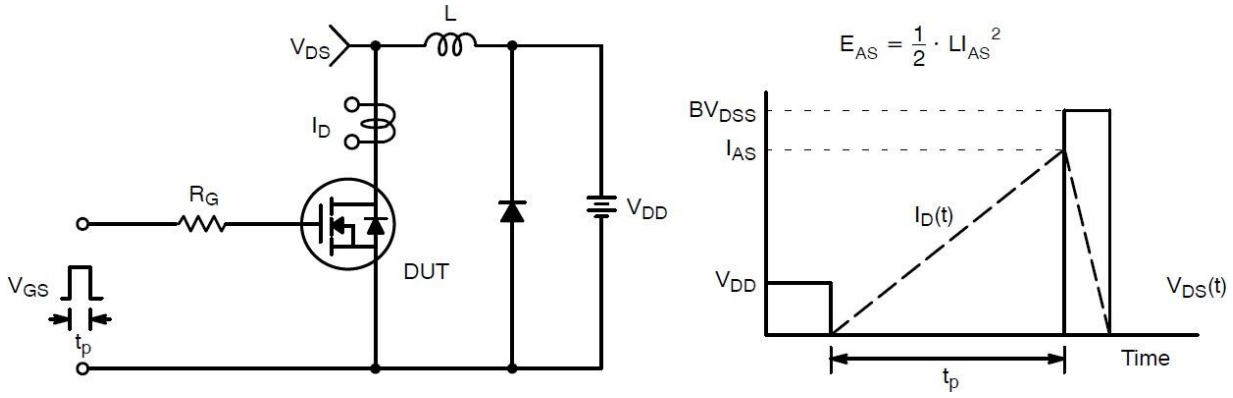
Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform

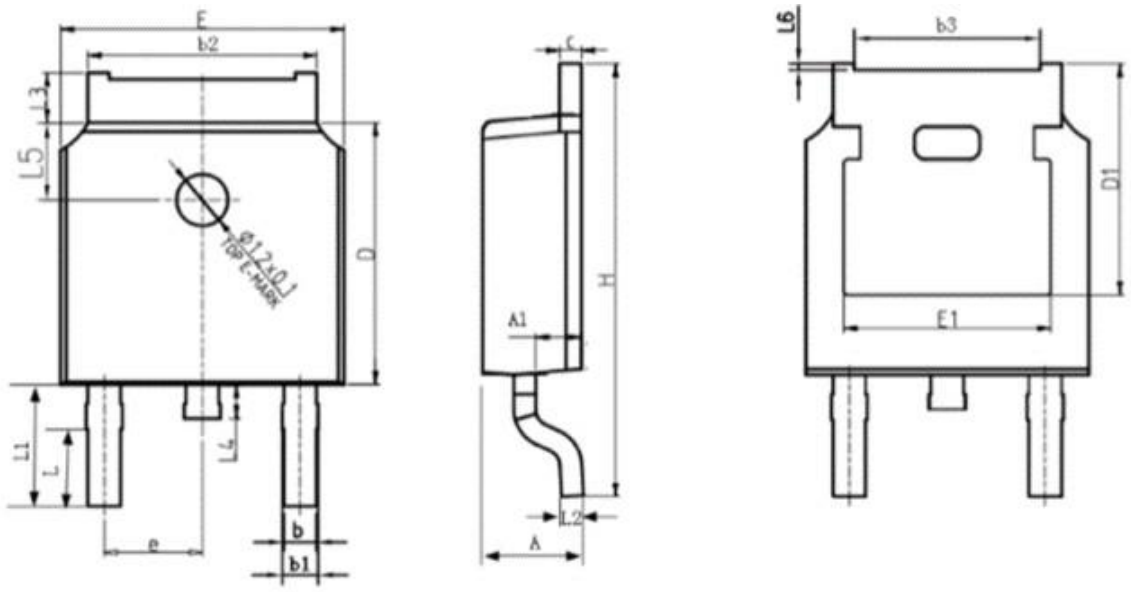


Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

Package Information:



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.056	0.061
A1	0.970	1.17	0.025	0.030
b	0.720	0.850	0.018	0.022
b1	0.720	0.930	0.018	0.024
b2	5.230	5.460	0.133	0.139
b3	4.270	4.370	0.108	0.111
c	0.470	0.580	0.012	0.015
D	6.000	6.200	0.152	0.157
D1	5.300 TYP.		0.135	
E	6.500	6.700	0.165	0.170
E1	4.700	4.920	0.119	0.125
e	2.286 TYP		0.058	
L	1.400	1.700	0.036	0.043
L1	2.900 TYP.		0.074	
L2	0.510 TYP.		0.013	
L3	0.900	1.250	0.023	0.032
L4	0.600	1.000	0.015	0.025
L5	1.700	1.900	0.043	0.048
L6	0	0.1223	0.000	0.003

Revision History:

Revision	Date	Descriptions
REV 1.0	Apr.2021	Initial Version