

Features

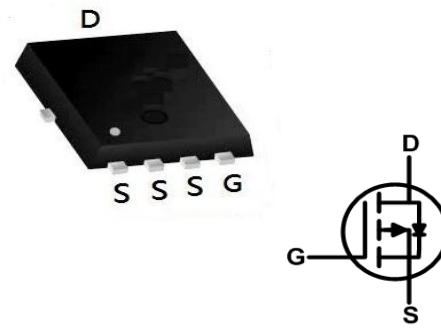
- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$


Product Summary

BVDSS	RDSON	ID
- 60V	12 mΩ	-60A

Applications

- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

PRPAK5X6 Pin Configuration

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified):

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	-60	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	A
	Continuous Drain Current	$T_C = 100^\circ\text{C}$	A
I_{DM}^{a1}	Pulsed Drain Current	-240	A
V_{GS}	Gate-to-Source Voltage	± 20	V
P_D	Power Dissipation	114	W
E_{AS}^{a2}	Single pulse avalanche energy	337	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	260	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.1	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	60	$^\circ\text{C}/\text{W}$

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified) :

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-60	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS} = -60V, V_{GS}= 0V$	--	--	1	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS} = -20V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS} = +20V$	--	--	-100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.3	-1.8	-2.3	V
$R_{DS(ON)1}$	Drain-to-Source Resistance	On- $V_{GS}=-10V, I_D=-20A$	--	12	16	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source Resistance	On- $V_{GS}=-4.5V, I_D=-10A$	--	16	20	$m\Omega$

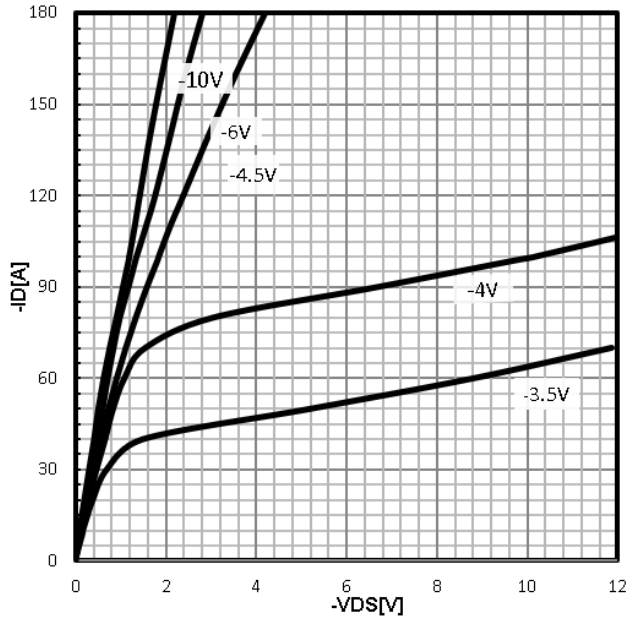
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=-30V$ $f=1.0MHz$	--	2630	--	pF
C_{oss}	Output Capacitance		--	484	--	
C_{rss}	Reverse Transfer Capacitance		--	9.4	--	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}$ Open	--	12.5	--	Ω

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=-10A, R_L=3.0\Omega$ $V_{DS}= -30V$ $V_{GS}= -10V$ $R_G= 3\Omega$	--	20	--	ns
t_r	Rise Time		--	25	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	60	--	
t_f	Fall Time		--	30	--	
Q_g	Total Gate Charge	$V_{GS}=-10V$	--	38	--	nC
Q_{gs}	Gate Source Charge	$V_{DS}=-30V$	--	6.9	--	
Q_{gd}	Gate Drain Charge	$I_D=-10A$	--	4.98	--	

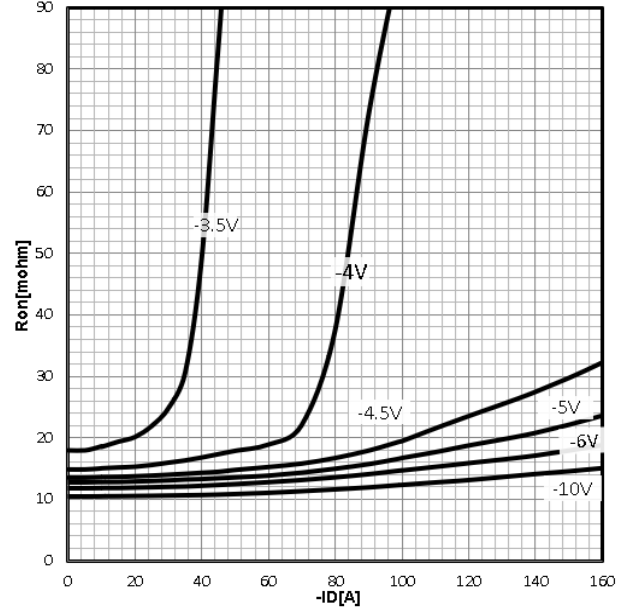
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25^\circ C$	--	--	-60	A
V_{SD}	Diode Forward Voltage	$I_S=-5.0A, V_{GS}=0V$	--	--	-1.2	V
t_{rr}	Reverse Recovery time	$I_S=-10A, V_{DD}=-30V$ $dI/dt=100A/\mu s$	--	50	--	ns
Q_{rr}	Reverse Recovery Charge		--	80	--	nC

Characteristics Curve:

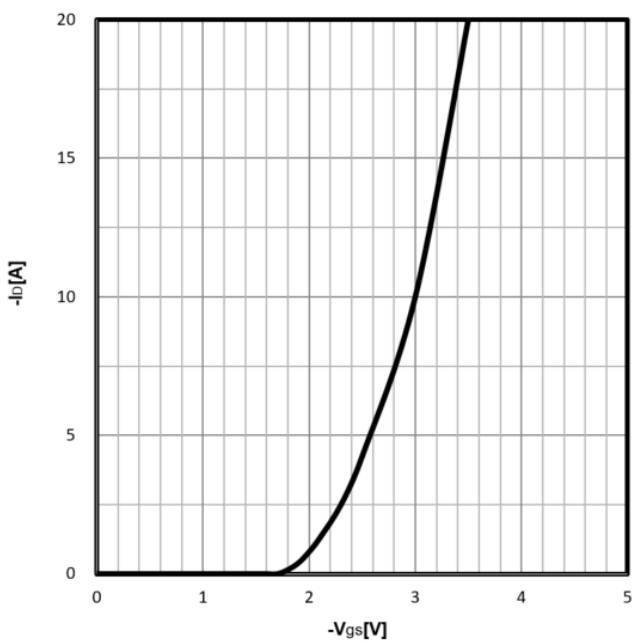
Typ. output characteristics
 $-I_D = f(-V_{DS})$



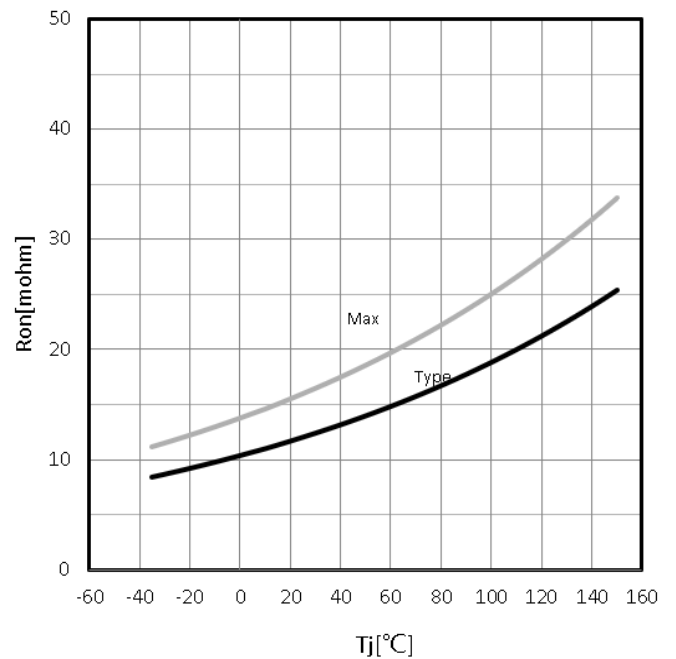
Typ. drain-source on resistance
 $R_{DS(on)} = f(-I_D)$



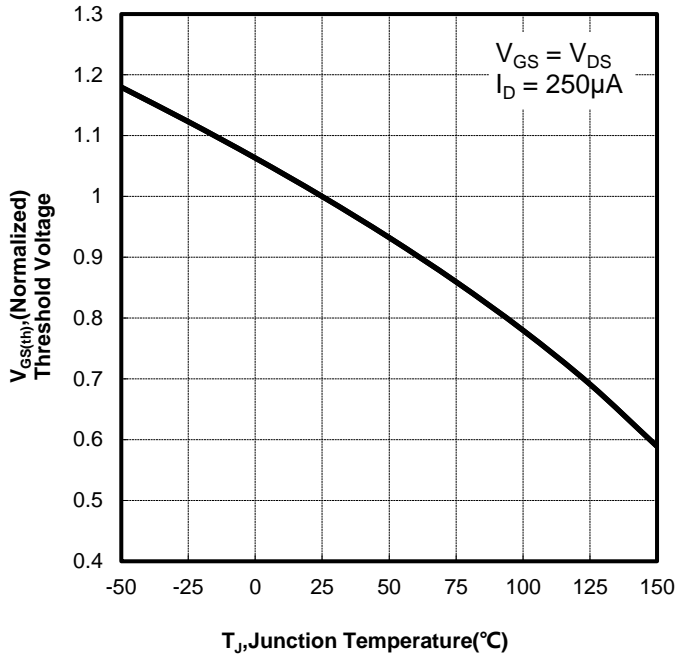
Typ. transfer characteristics
 $-I_D = f(-V_{GS})$



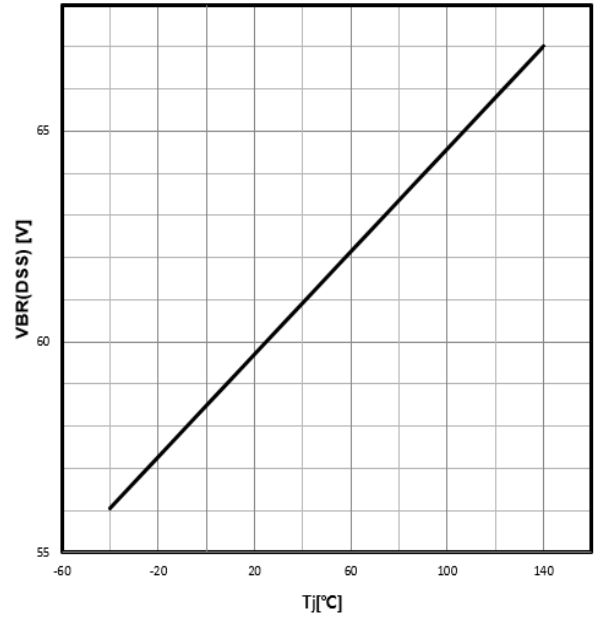
Drain-source on-state resistance
 $R_{DS(on)} = f(T_j); I_D = -20A; V_{GS} = -10V$



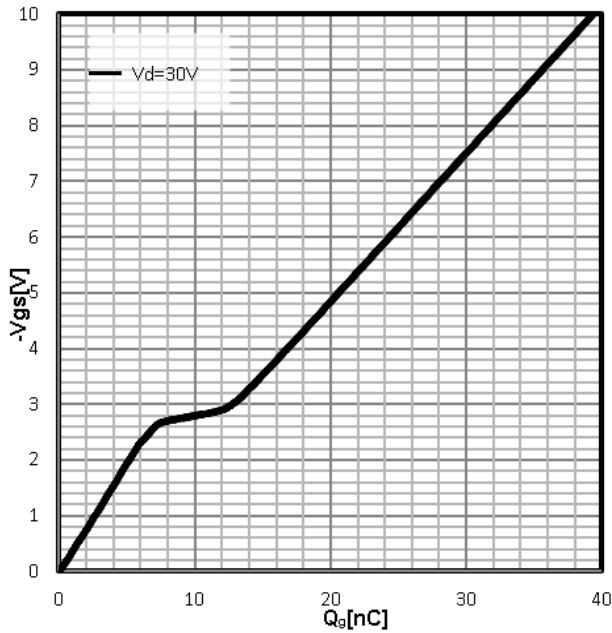
Gate Threshold Voltage
 $-V_{TH}=f(T_j); I_D=-250\mu A$



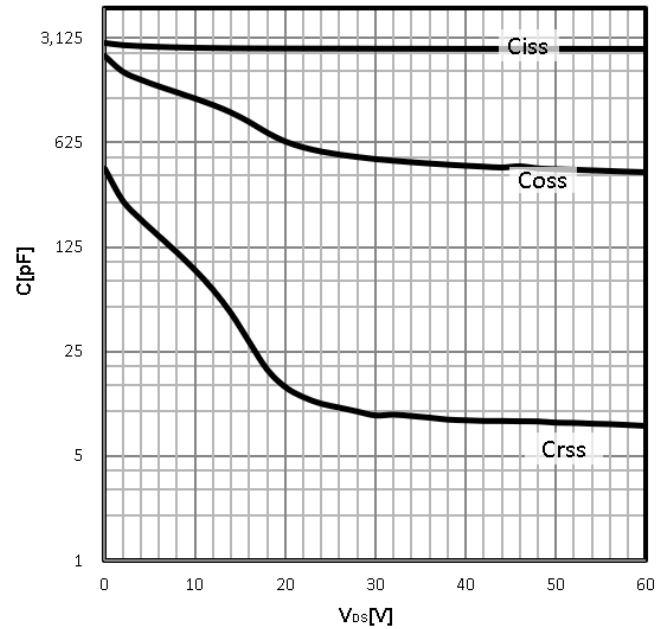
Drain-source breakdown voltage
 $-V_{BR(DSS)}=f(T_j); I_D=-250\mu A$



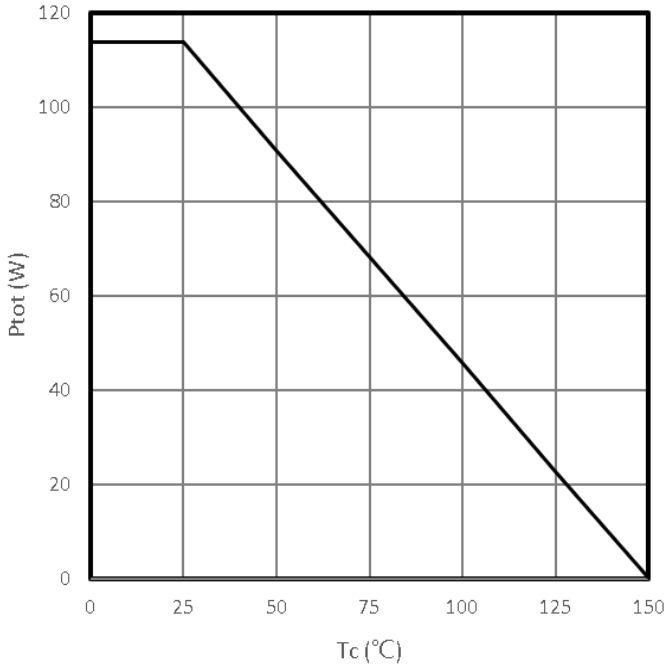
Typ. gate charge
 $V_{GS}=f(Q_{gate}); I_D=-10A$



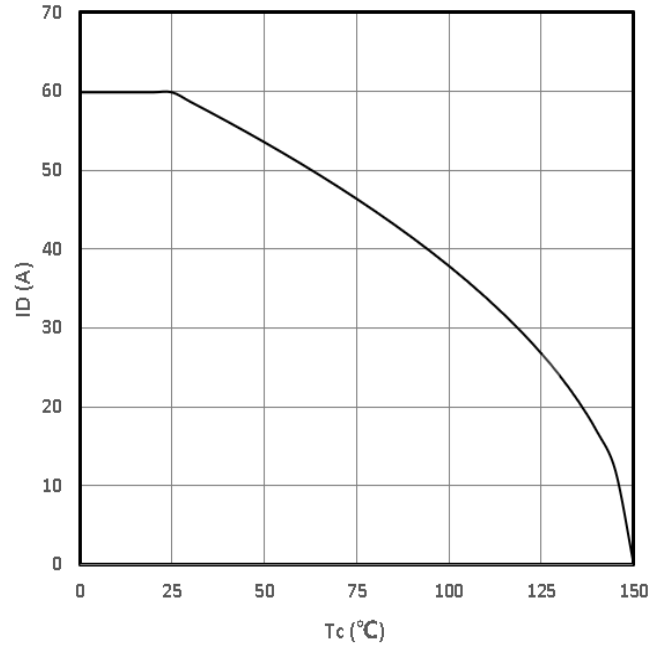
Typ. Capacitances
 $C=f(-V_{DS}); V_{GS}=0V; f=1MHz$



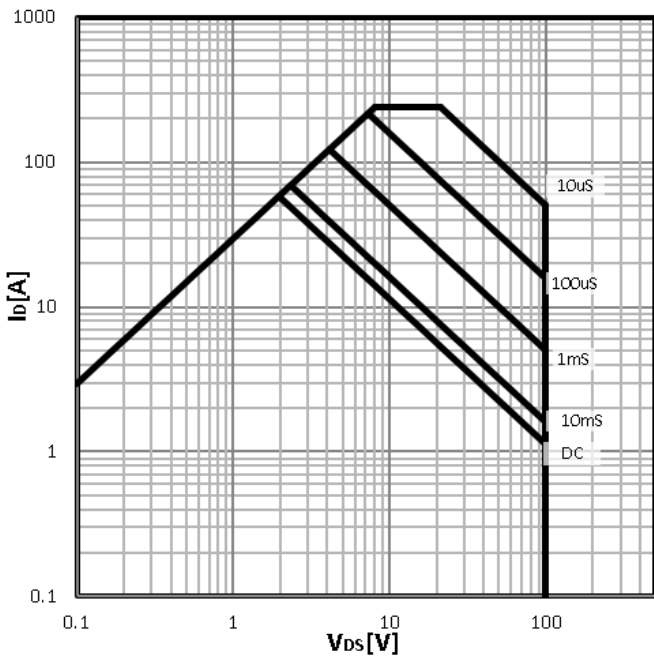
Power Dissipation
 $P_{tot}=f(T_C)$



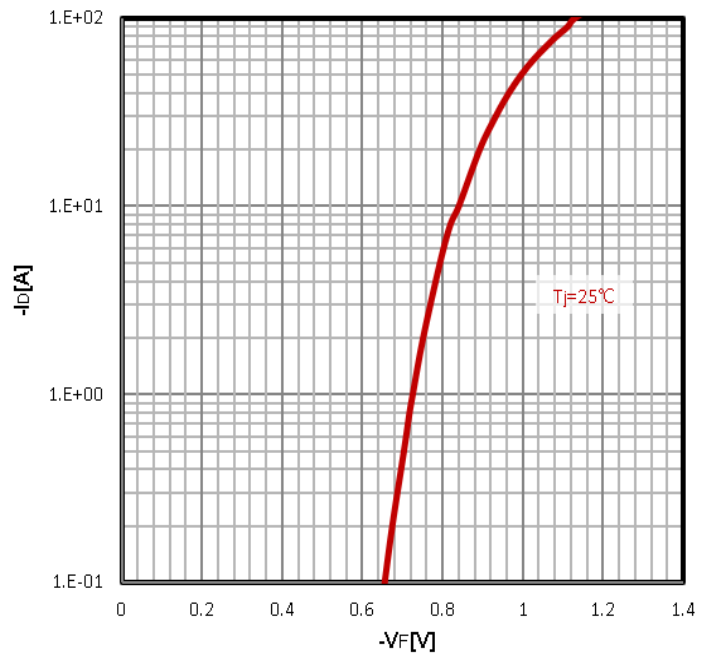
Maximum Drain Current
 $-I_D=f(T_C)$



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

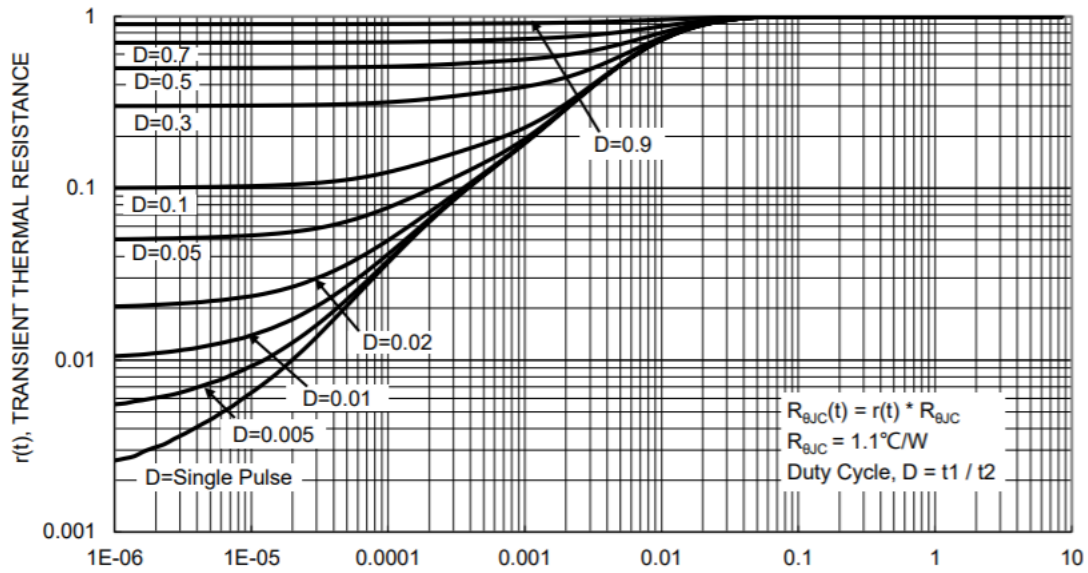


Body Diode Forward Voltage Variation
 $-I_F=f(-V_{DS})$

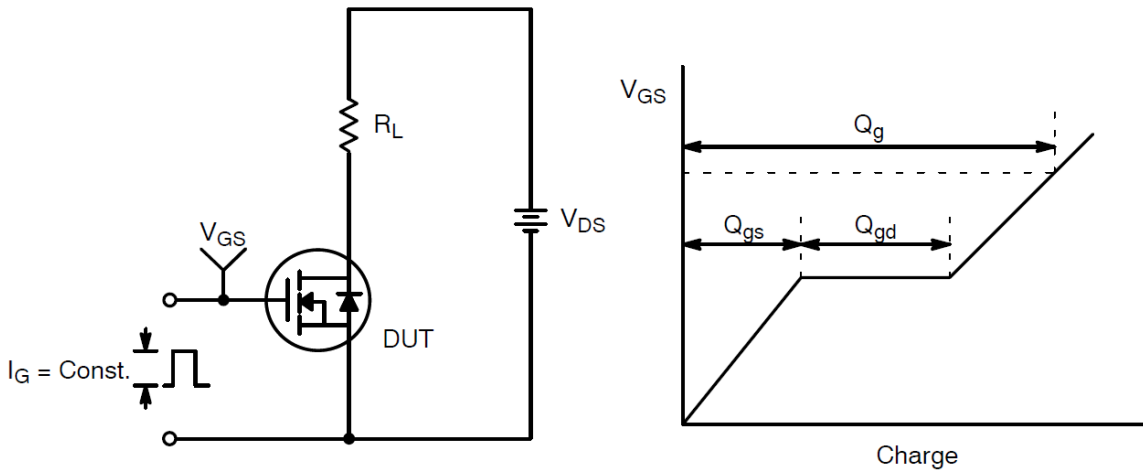


Max. transient thermal impedance

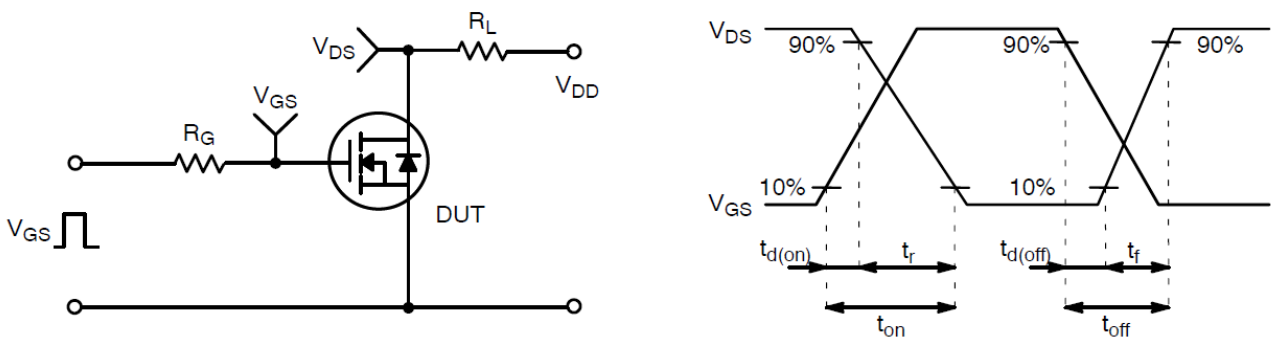
$$Z_{thJC} = f(t_p)$$



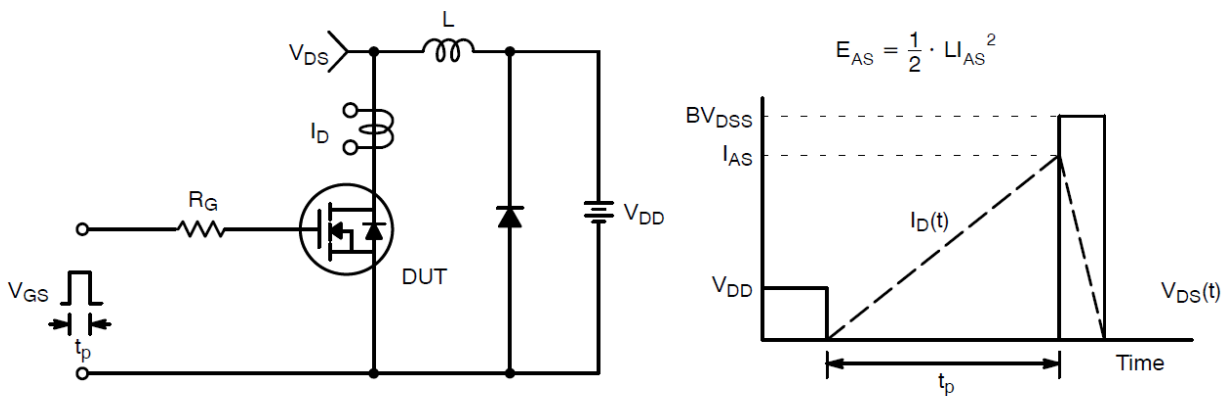
Test Circuit and Waveform:



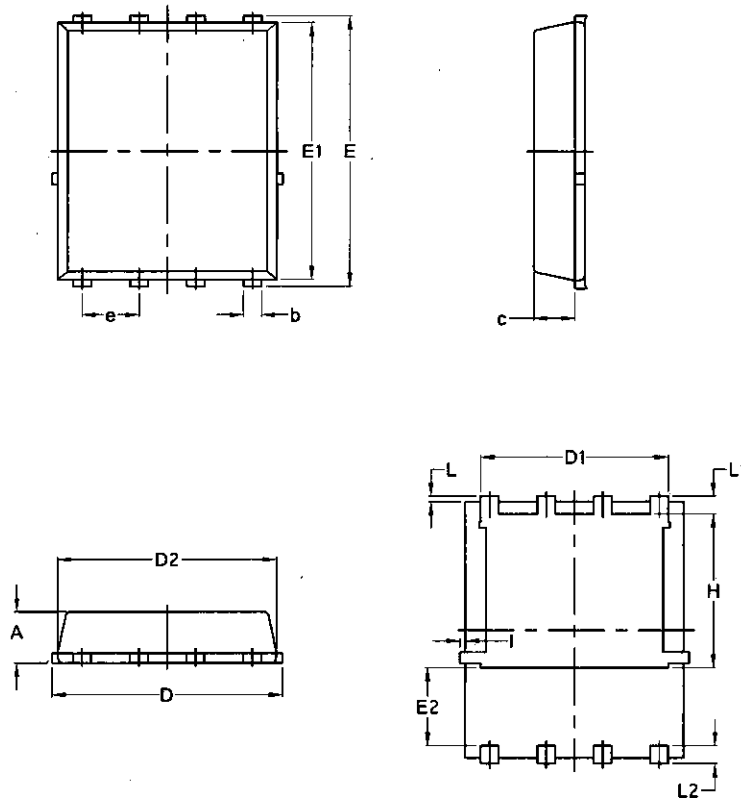
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data-DFN5*6-8L-JQ Single


Symbol	Common			
	mm		Inch	
	Min	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070