GP ELECTRONICS

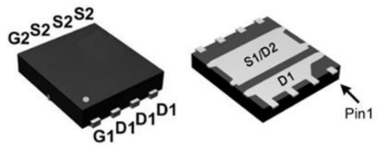
GPT051ND03LGK

30V N-Channel MOSFET

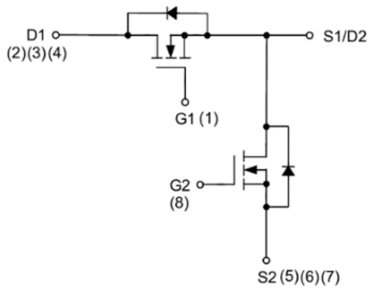
Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
30V	5.1mΩ@10V(Channel1)	54A
	8.5mΩ@4.5V(Channel1)	
	5.1mΩ@10V(Channel2)	60A
	8.5mΩ@4.5V(Channel2)	

DFN5X6-8L



Schematic diagram



Feature

- Split Gate Trench Technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

Application

- Power Management
- DC/DC Converter

Package Marking and Ordering Information

Part Number	Package	Marking	Packing	Reel Size	Tape Width	Qty
GPT051ND03LGK	DFN5X6-8L	T051ND03L	Reel & Tape	330mm	12mm	5000pcs

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Parameter		Symbol	Channel1	Channel2	Unit
Drain-Source Voltage		V_{DS}	30		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current[1]	T_C = 25°C	I_D	50	55	A
	T_C = 100°C		31.5	34.5	
Pulsed Drain Current[2]		I_{DM}	200	220	A
Single Pulsed Avalanche Current[3]		I_{AS}	15	17	A
Single Pulsed Avalanche Energy[3]		E_{AS}	56	72	mJ
Power Dissipation[5]	T_C = 25°C	P_D	25	31.25	W
Thermal Resistance from Junction to Ambient[6]		$R_{\theta JA}$	48	45	°C/W
Thermal Resistance from Junction to Case		$R_{\theta JC}$	5	4	°C/W
Junction Temperature		T_J	150		°C
Storage Temperature		T_{STG}	-55~ +150		°C

MOSFET ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Channel1:

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V			1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
On Characteristics[4]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.5	2.2	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 15A		5.1	6.5	mΩ
		V_{GS} = 4.5V, I_D = 10A		8.0	11	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz		608		pF
Output Capacitance	C_{oss}			350		
Reverse Transfer Capacitance	C_{rss}			14		
Gate Resistance	R_g	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz		1.3		Ω
Switching Characteristics						
Total Gate Charge	Q_g	V_{DS} = 15V, V_{GS} = 10V, I_D = 20A		11.3		nC
Gate-Source Charge	Q_{gs}			1.8		
Gate-Drain Charge	Q_{gd}			2.2		
Gate Plateau Voltage	$V_{plateau}$			2.8		V
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15V, V_{GS} = 10V, I_D = 20A, R_G = 3Ω		4		ns
Turn-On Rise Time	t_r			5		
Turn-Off Delay Time	$t_{d(off)}$			32		
Turn-Off Fall Time	t_f			15		
Source-Drain Diode Characteristics						
Diode Forward Voltage[4]	V_{SD}	V_{GS} = 0V, I_S = 2A			1.2	V
Diode Continuous Forward Current[1]	I_S	T_C = 25℃			50	A
Diode Pulse Forward Current[2]	I_{SM}	T_C = 25℃			200	A
Diode Reverse Recovery Time	t_{rr}	I_F = 15A, dI/dt = 100A/µs		12		ns
Diode Reverse Recovery Charge	Q_{rr}	I_F = 15A, dI/dt = 100A/µs		3.2		nC

Channel2:

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V			1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
On Characteristics[4]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.5	2.2	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 30A		5.1	6.5	mΩ
		V_{GS} = 4.5V, I_D = 15A		8.0	11	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz		608		pF
Output Capacitance	C_{oss}			350		
Reverse Transfer Capacitance	C_{rss}			14		
Gate Resistance	R_g	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz		1.3		Ω
Switching Characteristics						
Total Gate Charge	Q_g	V_{DS} = 15V, V_{GS} = 10V, I_D = 20A		11.3		nC
Gate-Source Charge	Q_{gs}			1.8		
Gate-Drain Charge	Q_{gd}			2.2		
Gate Plateau Voltage	$V_{plateau}$			2.8		V
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15V, V_{GS} = 10V, I_D = 20A, R_G = 3Ω		4		ns
Turn-On Rise Time	t_r			5		
Turn-Off Delay Time	$t_{d(off)}$			32		
Turn-Off Fall Time	t_f			15		
Source-Drain Diode Characteristics						
Diode Forward Voltage[4]	V_{SD}	V_{GS} = 0V, I_S = 1A			1.2	V
Diode Continuous Forward Current[1]	I_S	T_C = 25℃			55	A
Diode Pulse Forward Current[2]	I_{SM}	T_C = 25℃			220	A
Diode Reverse Recovery Time	t_{rr}	I_F = 15A, dI/dt = 100A/µs		12		ns
Diode Reverse Recovery Charge	Q_{rr}	I_F = 15A, dI/dt = 100A/µs		3.2		nC

Notes:

1.The maximum current rating is limited by package. And device mounted on a large heatsink.

2.Pulse Test: Pulse Width ≤ 10μs, duty cycle ≤ 1%.

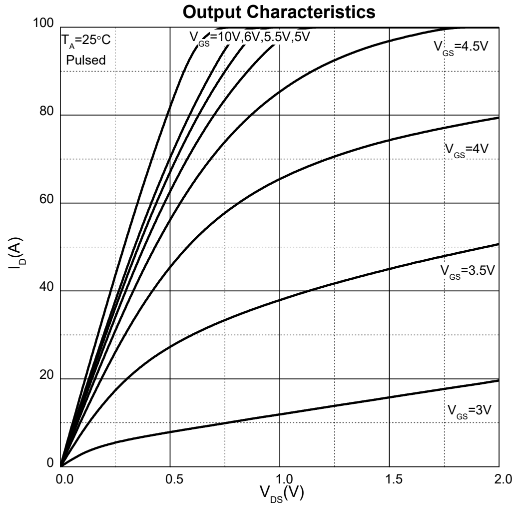
3.E_{AS} condition: V_{DD} = 30V, V_{GS} = 10V, L = 0.5mH, R_G = 25Ω Starting T_J = 25°C.

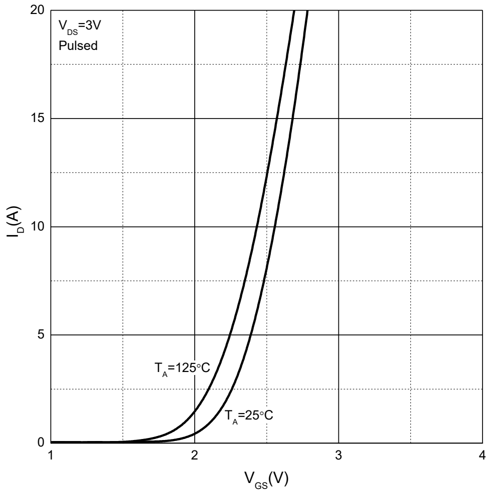
4.Pulse Test: Pulse Width ≤ 300μs, duty cycle ≤ 2%.

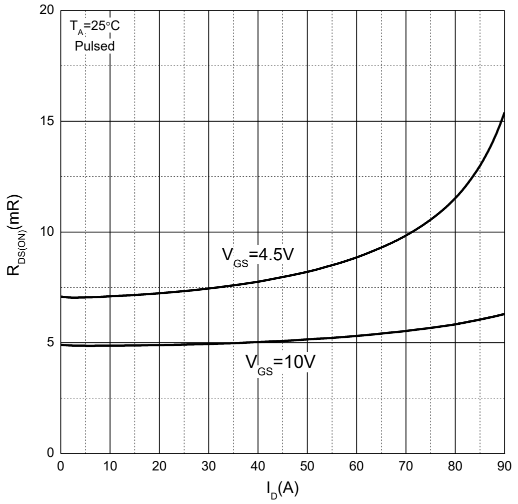
5.The power dissipation P_D is limited by $T_{J(MAX)}$ = 150°C. And device mounted on a large heatsink.

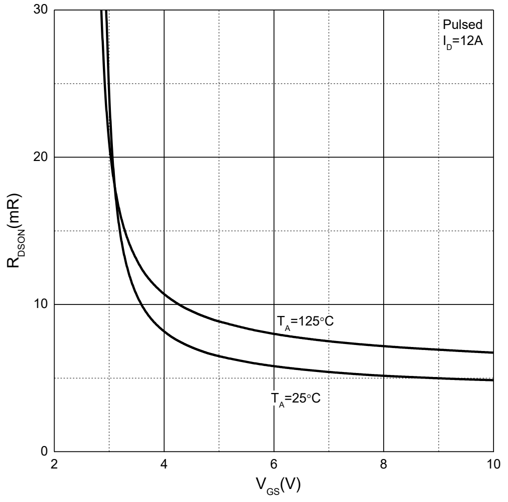
6.Device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C.

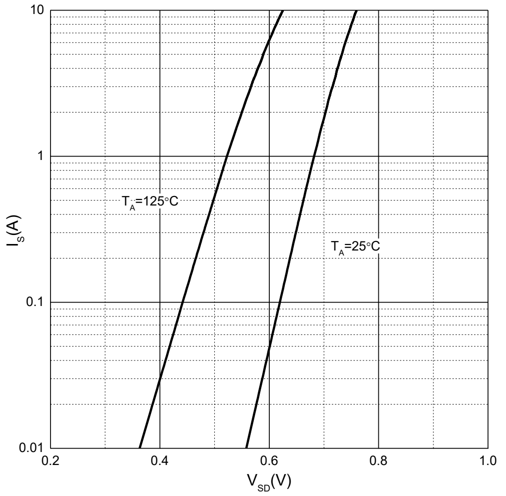
Channel1 Typical Characteristics

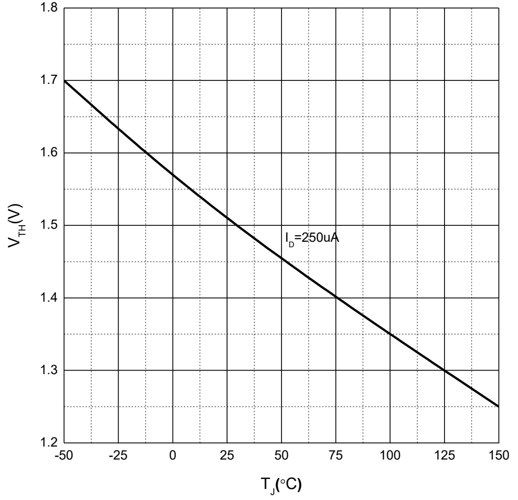

Output Characteristics

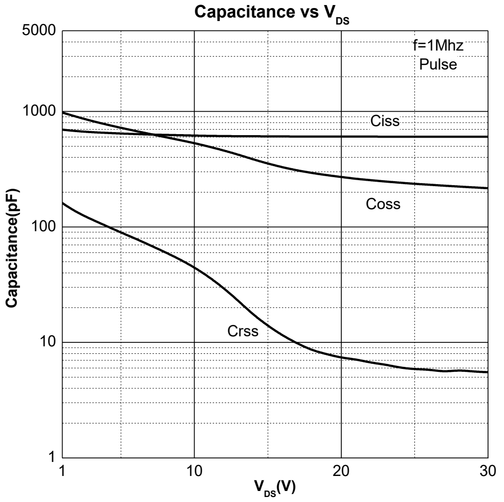

Transfer Characteristics

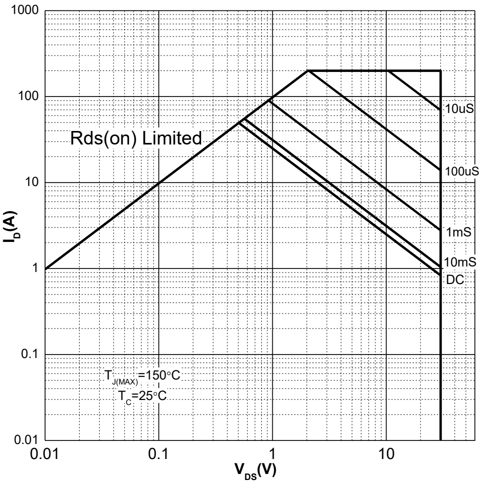

RDS(ON) vs ID

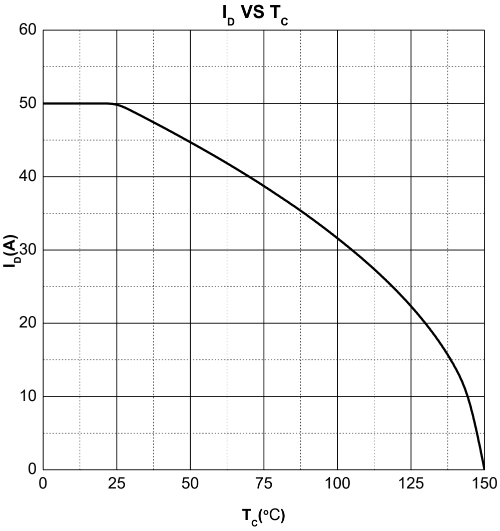

RDS(ON) vs VGS

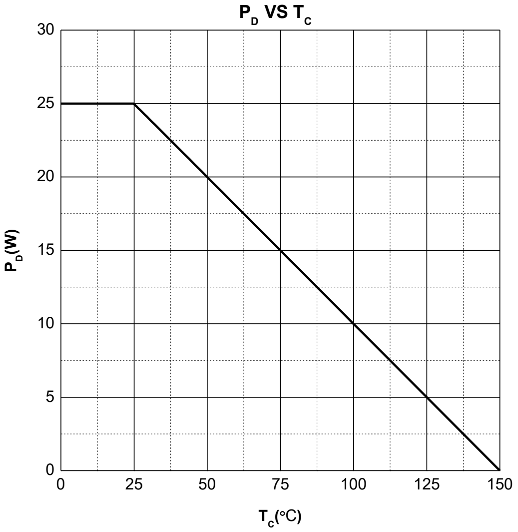

IS vs VSD

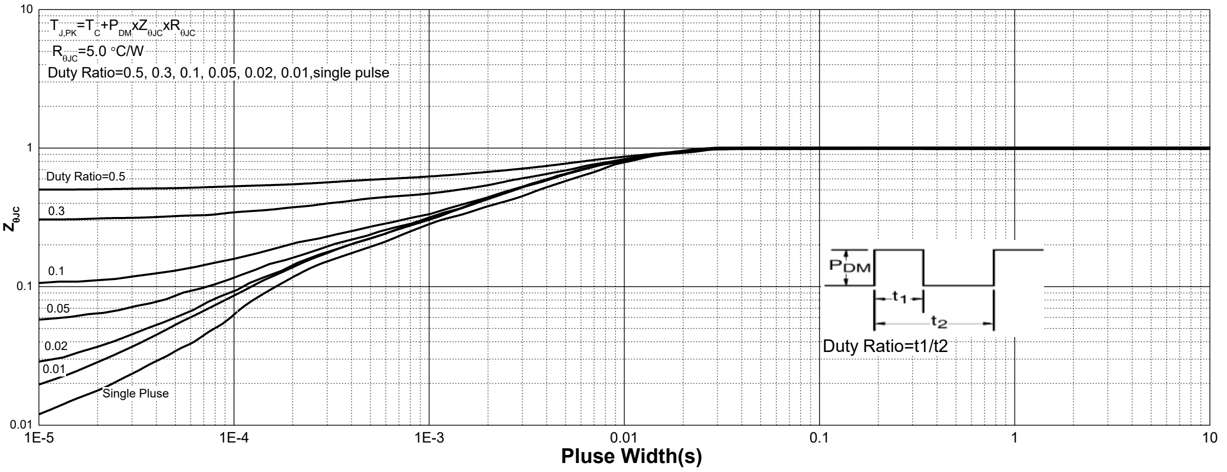

Threshold Voltage


Capacitance vs V_{DS}


Maximum Forward Biased Safe Operating Area

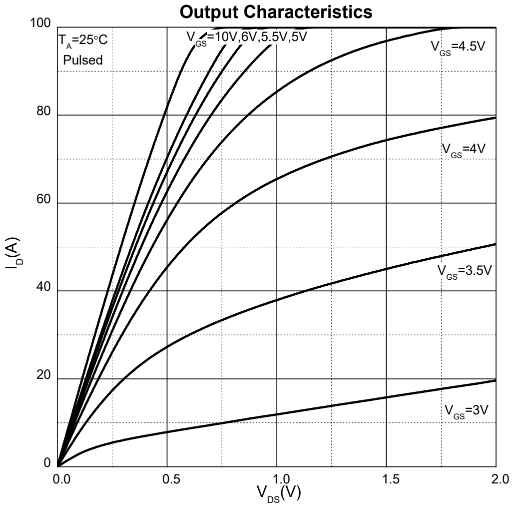

I_D VS T_C


P_D VS T_C

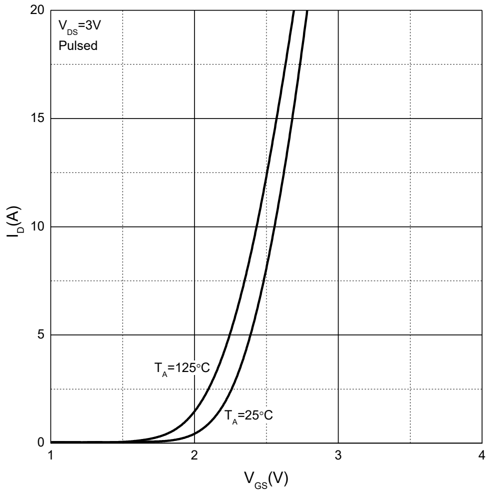

Normalized Maximum Transient Thermal Impedance

Channel2 Typical Characteristics

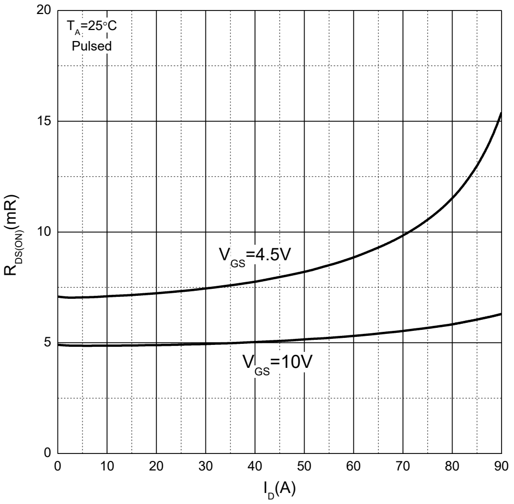
Output Characteristics



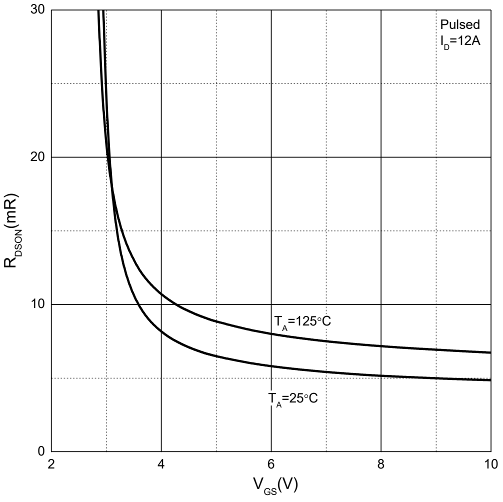
Transfer Characteristics



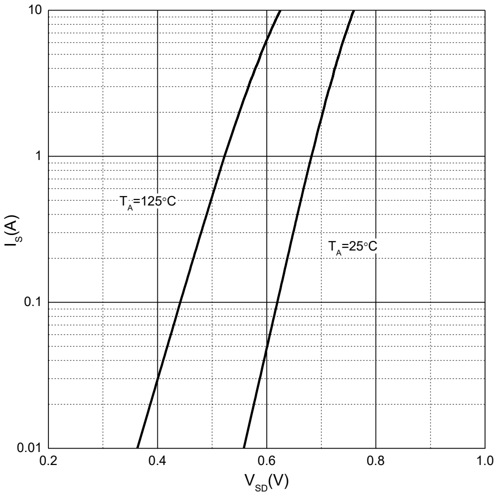
$R_{DS(ON)}$ vs I_D



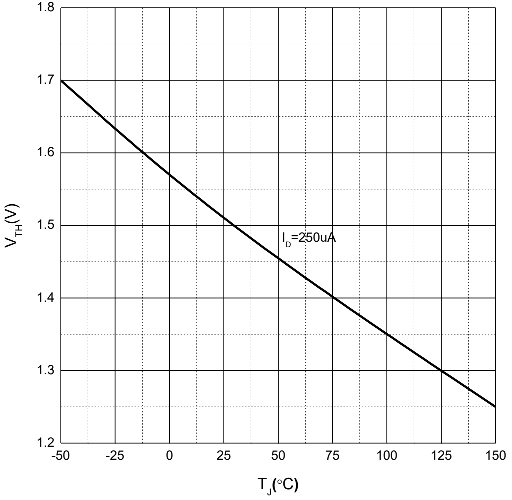
$R_{DS(ON)}$ vs V_{GS}

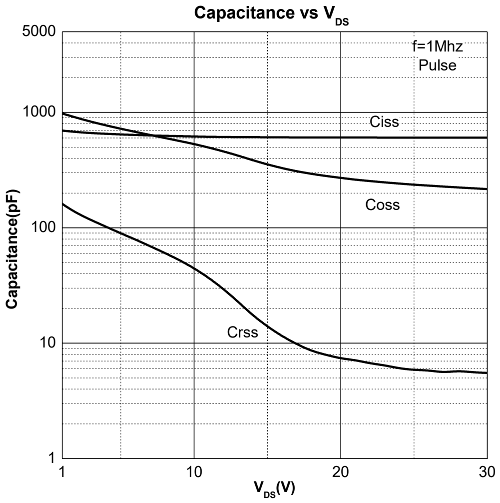


I_S vs V_{SD}

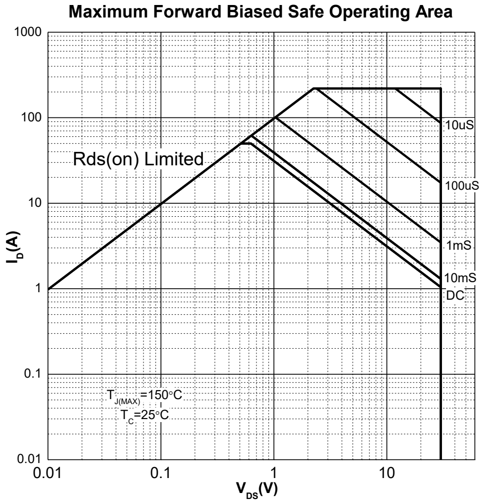


Threshold Voltage

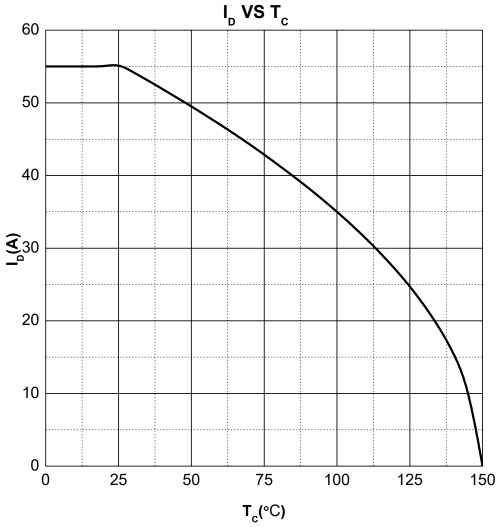




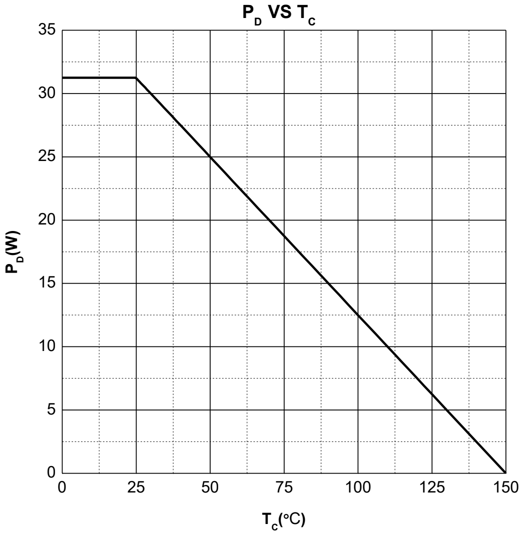
Capacitance vs V_{DS}



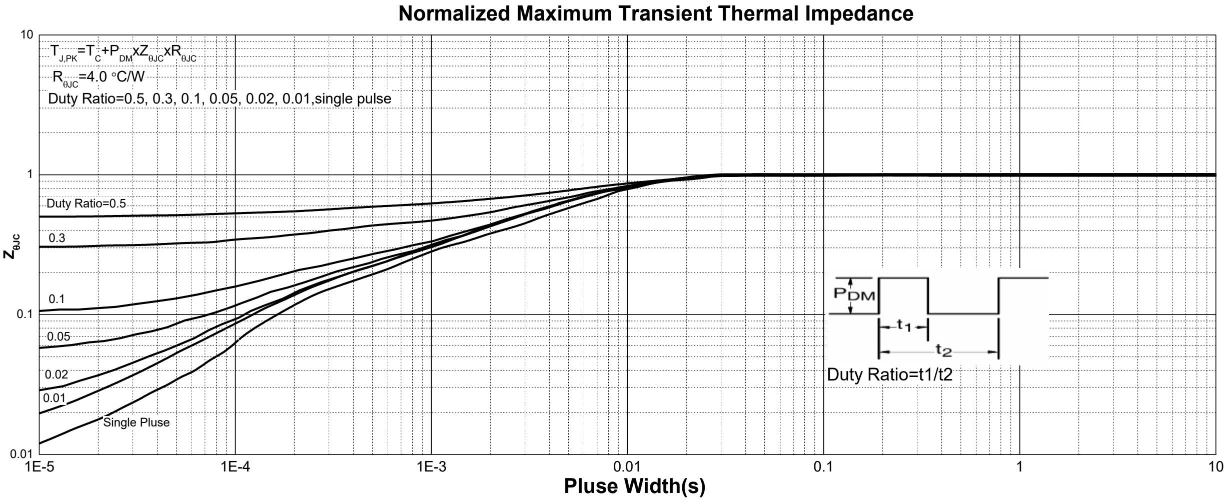
Maximum Forward Biased Safe Operating Area



I_D VS T_C



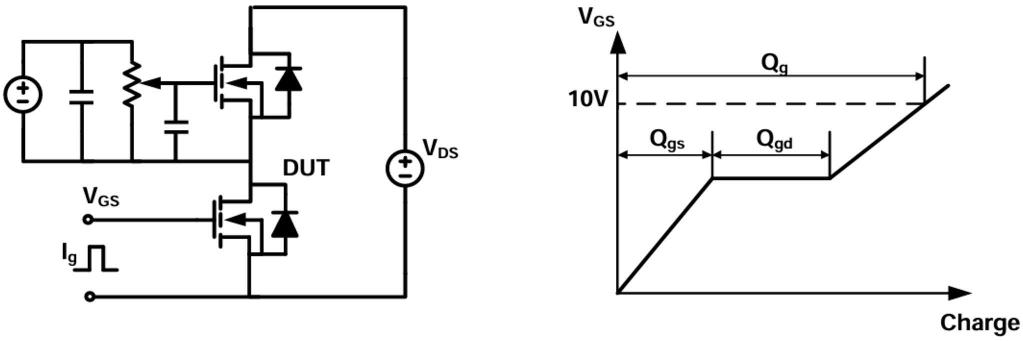
P_D VS T_C



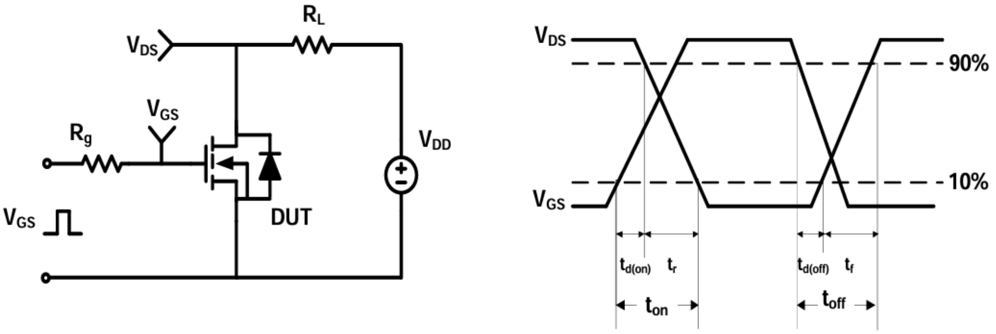
Normalized Maximum Transient Thermal Impedance

Test Circuit

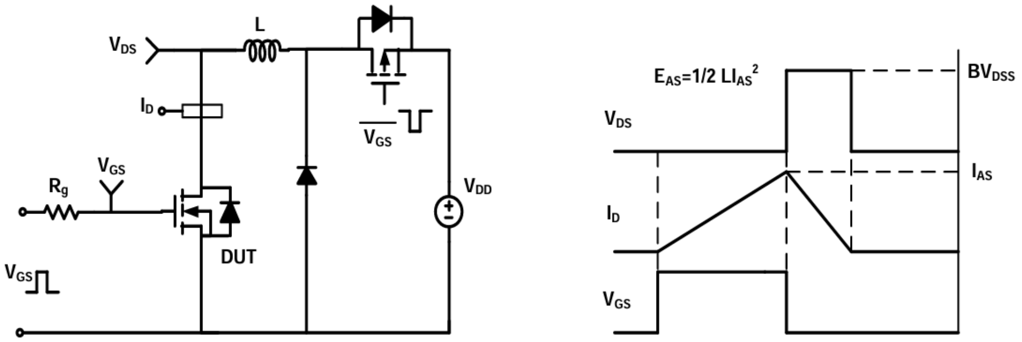
Gate Charge Test Circuit & Waveform



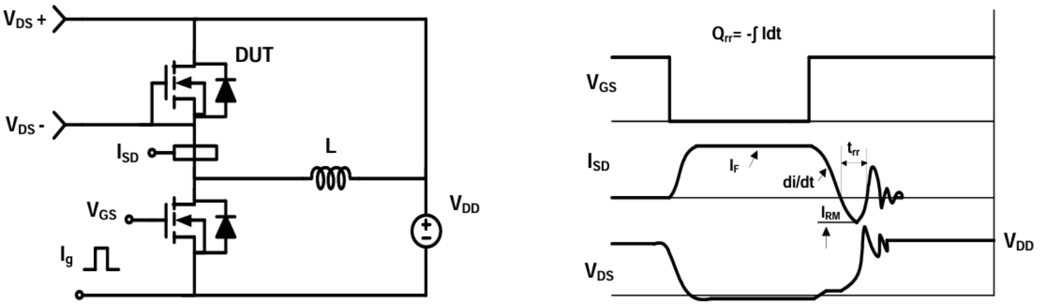
Resistive Switching Test Circuit & Waveform



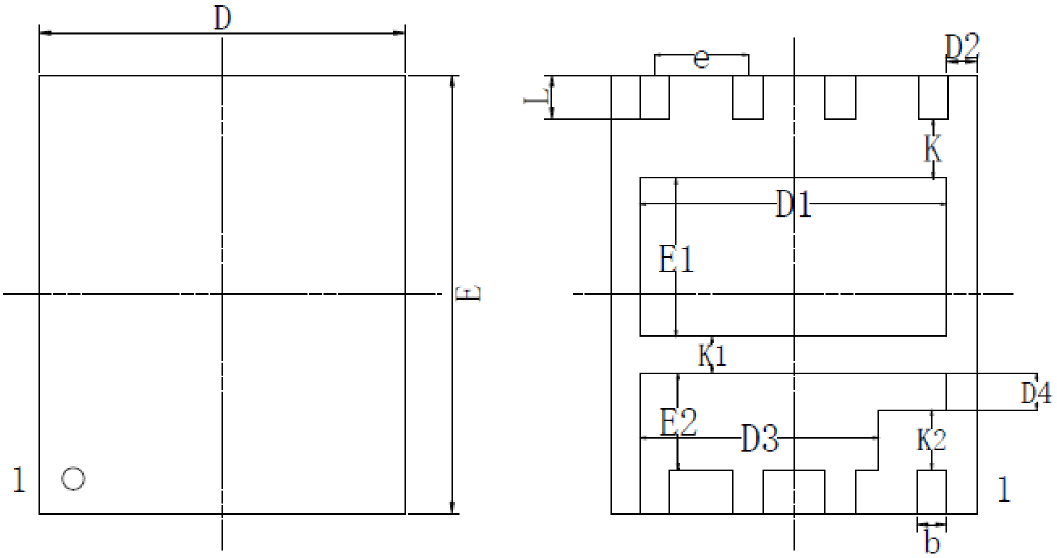
Unclamped Inductive Switching (UIS) Test Circuit & Waveform

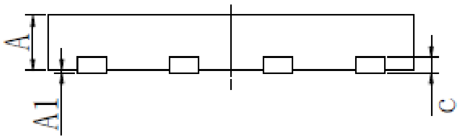


Diode Recovery Test Circuit & Waveform



DFN5X6-8L Package Information





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
A1	0	0.050	0.000	0.002
c	0.203REF		0.008REF	
D	4.95	5.05	0.195	0.199
E	5.95	6.05	0.234	0.238
D1	4.1	4.3	0.161	0.169
D2	0.390REF		0.015REF	
D3	3.17	3.37	0.125	0.133
D4	0.45	0.55	0.018	0.022
E1	2.07	2.27	0.081	0.089
E2	1.22	1.42	0.048	0.056
K	0.81BSC		0.032BSC	
K1	0.50BSC		1.032BSC	
K2	0.82BSC		2.032BSC	
b	0.36	0.46	0.014	0.018
e	1.27BSC		0.050BSC	
L	0.55	0.65	0.022	0.026

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- Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.
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