

N and P-Channel Enhancement Mode Power MOSFET

Description

The PTI1FF uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge.

It is available in SOP-8 package.

PTI1FF

PTI1FF

General Features

● N-Channel

$V_{DS} = +V, I_D = +I_A$

$R_{DS(ON)} < 11\text{m}\Omega @ V_{GS} = FV, I_D = I_A$

$R_{DS(ON)} < 11\text{m}\Omega @ V_{GS} = FV, I_D = I_A$

● P-Channel

$V_{DS} = -V, I_D = -I_A$

$R_{DS(ON)} < 11\text{m}\Omega @ V_{GS} = -FV$

PTI1FF

● $I_{AS} = 1.5A, I_{AS} = 1.5A$

● $I_{AS} = 1.5A, I_{AS} = 1.5A$

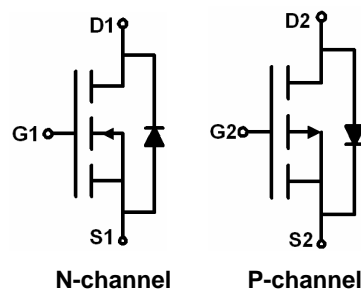
● $I_{AS} = 1.5A, I_{AS} = 1.5A$

Application

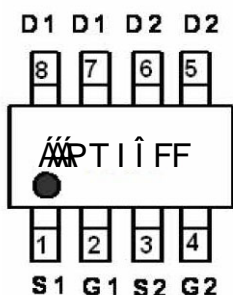
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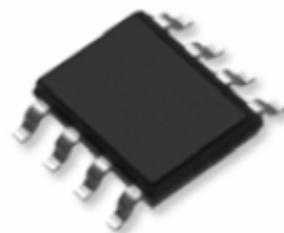
● $I_{AS} = 1.5A, I_{AS} = 1.5A$



Schematic diagram



Marking and pin assignment



SOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
PTI1FF	PTI1FF	SOP-8	Ø330mm	12mm	2500 units

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	10	-11	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current	I_D	1.5	1.5	A
Pulsed Drain Current (Note 1)	I_{DM}	30	-30	A
Maximum Power Dissipation	P_D	1.5	1.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	-55 To 150	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note2)	$R_{\theta JA}$	N-Ch	$\frac{1}{\theta_{JA}}$	$^{\circ}\text{C/W}$
		P-Ch	$\frac{1}{\theta_{JA}}$	

N-CH Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	60	69	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	2	3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =4.5A		38	45	
		V _{GS} =4.5V, I _D =3A	-	55	77	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =4.5A	11	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz		450		PF
Output Capacitance	C _{oss}			60		PF
Reverse Transfer Capacitance	C _{rss}			25		PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DS} =30V, I _D =4.5A V _{GS} =10V, R _{GEN} =3Ω	-	4.7	-	nS
Turn-on Rise Time	t _r		-	2.3	-	nS
Turn-Off Delay Time	t _{d(off)}		-	15.7	-	nS
Turn-Off Fall Time	t _f		-	1.9	-	nS
Total Gate Charge	Q _g	V _{DS} =30V, I _D =4.5A, V _{GS} =10V	-	8.5	-	nC
Gate-Source Charge	Q _{gs}		-	1.6	-	nC
Gate-Drain Charge	Q _{gd}		-	2.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =3.7A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	4	A

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P-CH Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-55	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-55V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.5	-2.6	-3.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-5A	-	64	80	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-15V, I _D =-5A	16	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =-20V, V _{GS} =0V, F=1.0MHz	-	1450	-	PF
Output Capacitance	C _{OSS}		-	145	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	110	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-30V, ,R _L =30Ω V _{GS} =-10V, R _{GEN} =6Ω	-	8	-	nS
Turn-on Rise Time	t _r		-	9	-	nS
Turn-Off Delay Time	t _{d(off)}		-	65	-	nS
Turn-Off Fall Time	t _f		-	30	-	nS
Total Gate Charge	Q _g	V _{DS} =-30V, I _D =-5A, V _{GS} =-10V	-	26	-	nC
Gate-Source Charge	Q _{gs}		-	4.5	-	nC
Gate-Drain Charge	Q _{gd}		-	7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-3A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-5	A

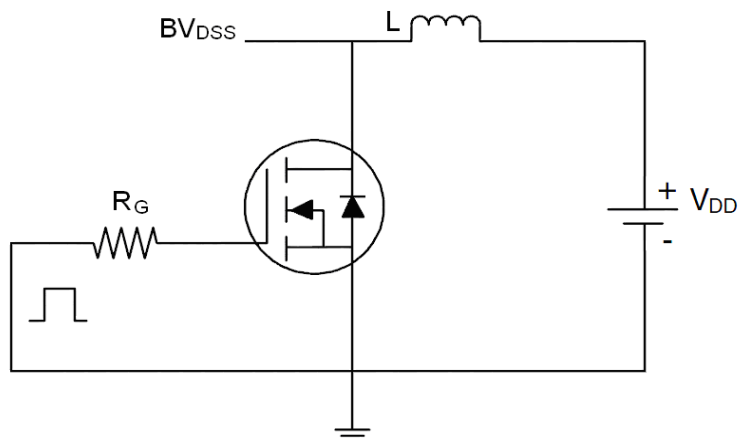
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

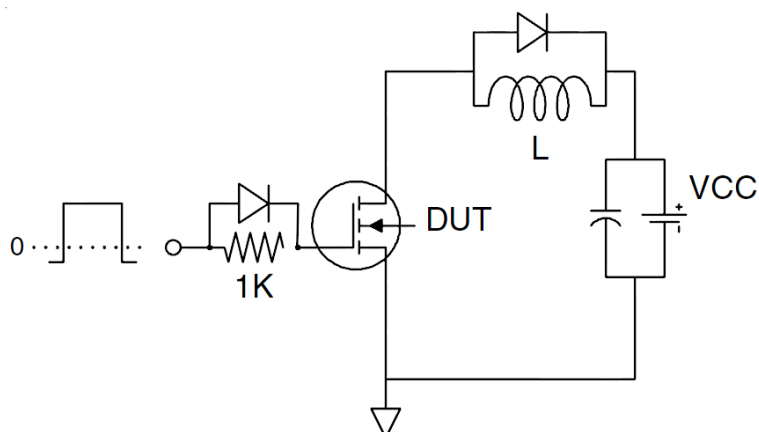
N- Channel Typical Electrical and Thermal Characteristics (Curves)

Test circuit

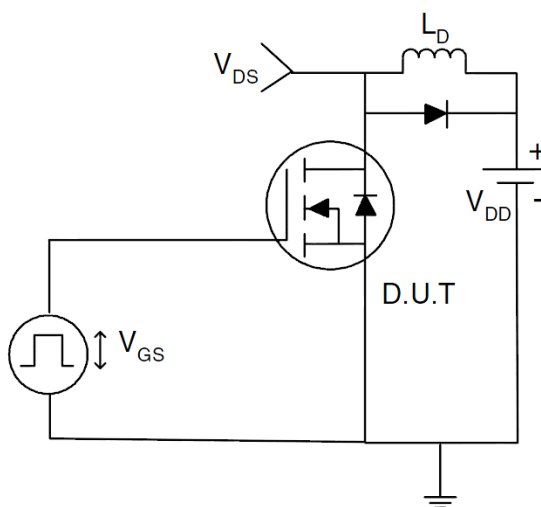
1) E_{AS} test Circuits



2) Gate charge test Circuit:



3) Switch Time Test Circuit:



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

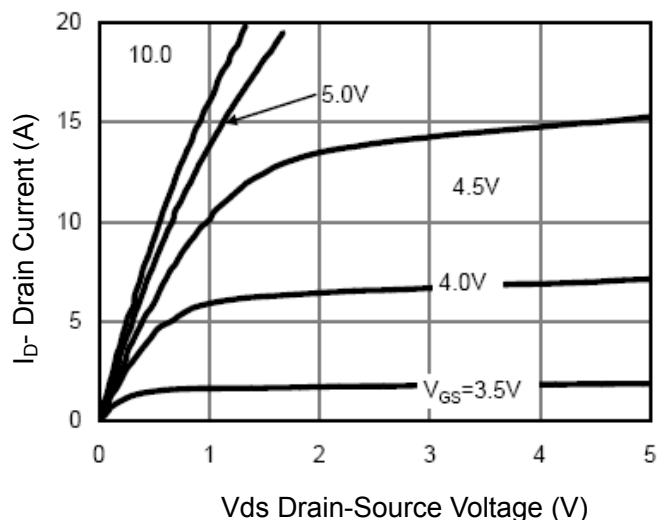


Figure 1 Output Characteristics

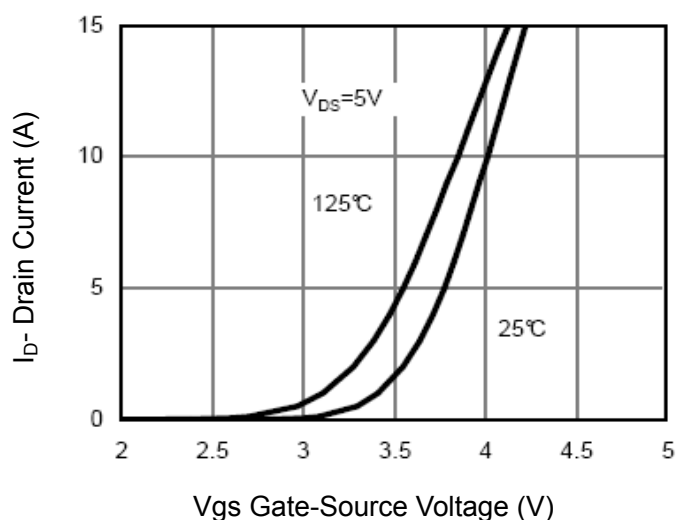


Figure 2 Transfer Characteristics

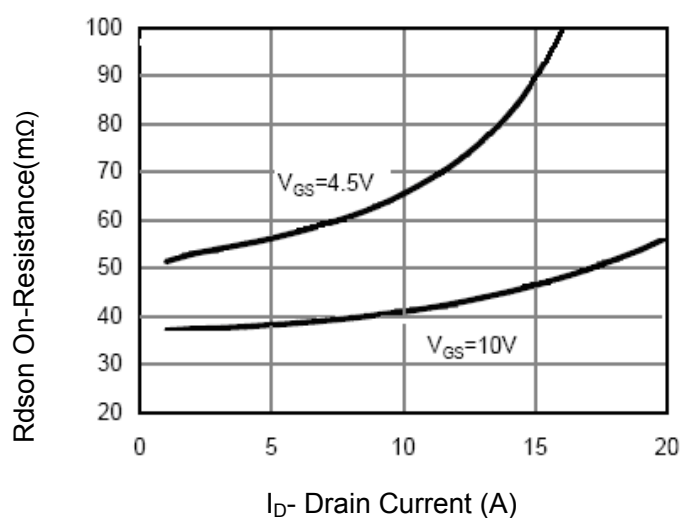


Figure 3 $R_{DS(on)}$ - Drain Current

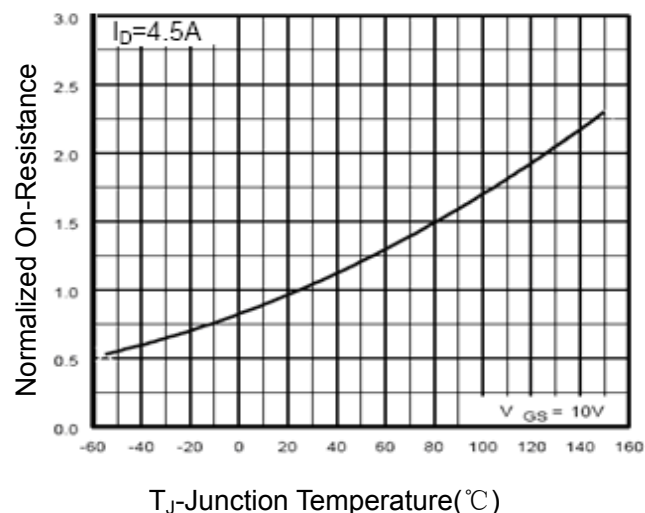


Figure 4 $R_{DS(on)}$ -Junction Temperature

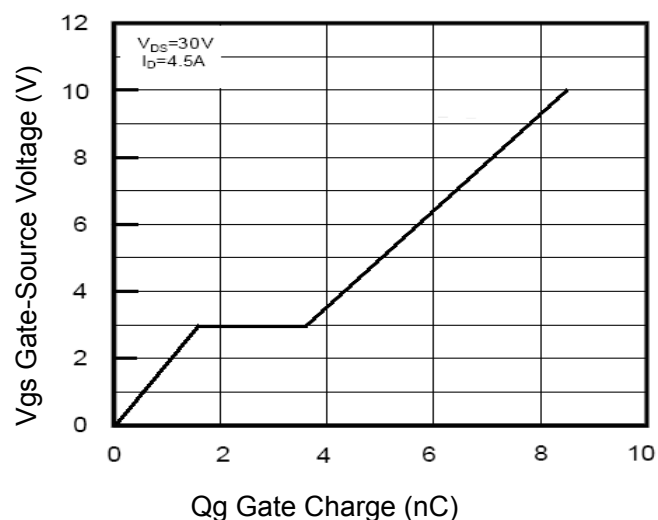


Figure 5 Gate Charge

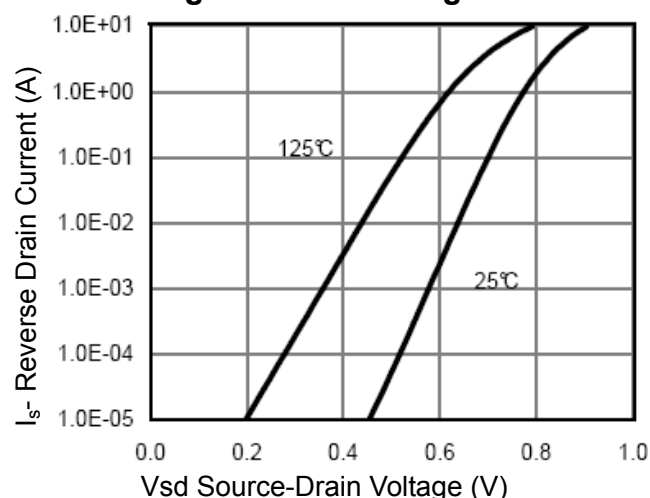


Figure 6 Source- Drain Diode Forward

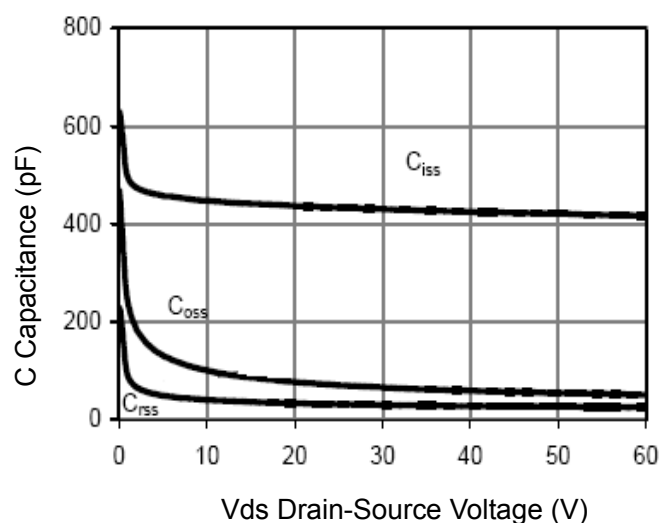


Figure 7 Capacitance vs Vds

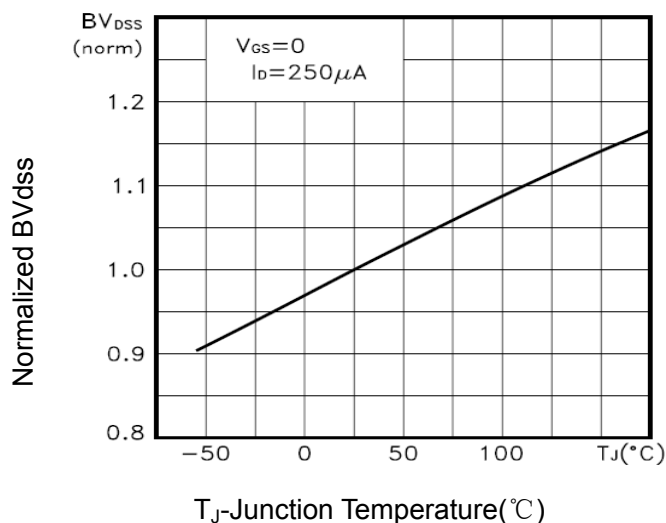


Figure 9 BV_{DSS} vs Junction Temperature

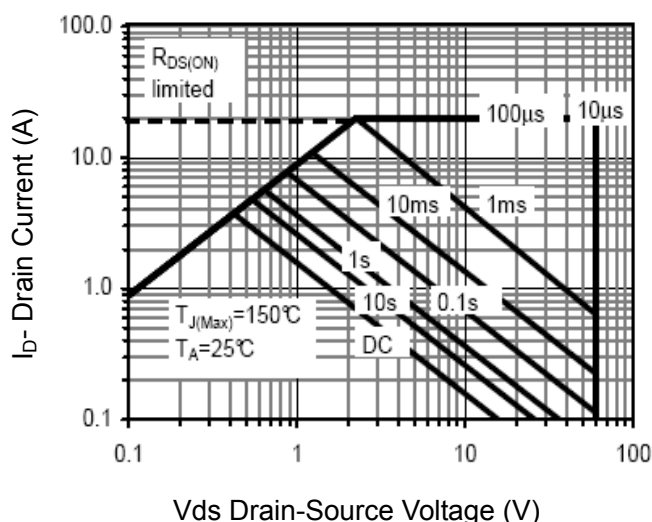


Figure 8 Safe Operation Area

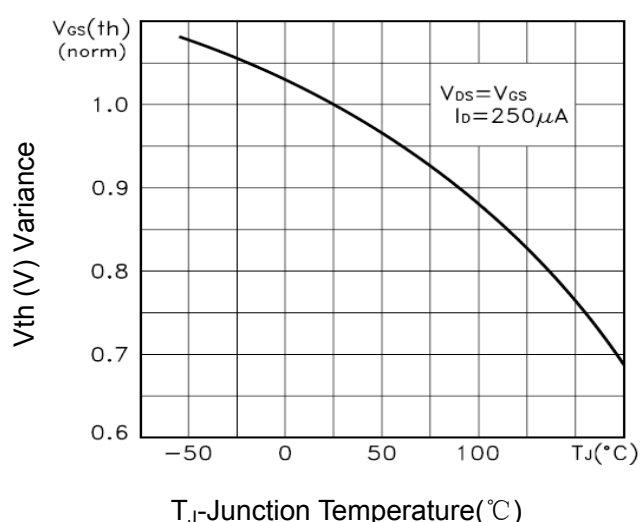


Figure 10 $V_{GS(th)}$ vs Junction Temperature

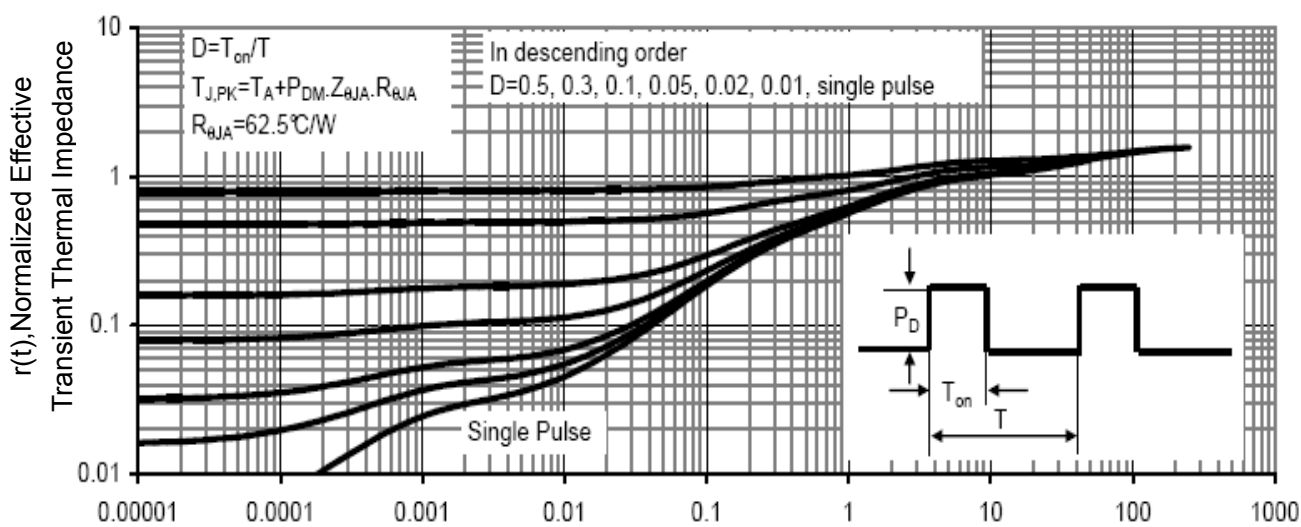
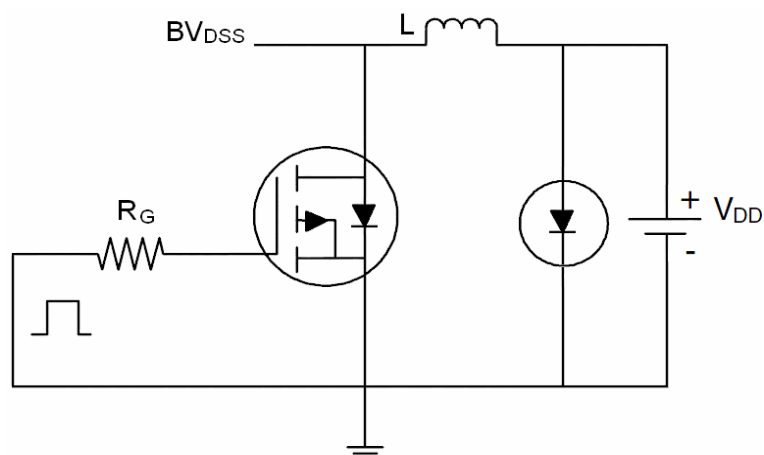


Figure 11 Normalized Maximum Transient Thermal Impedance

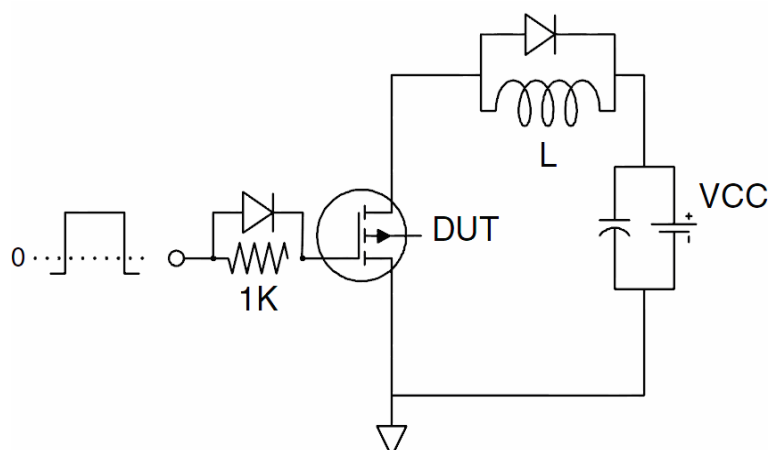
P-Channel Typical Electrical and Thermal Characteristics

Test Circuit

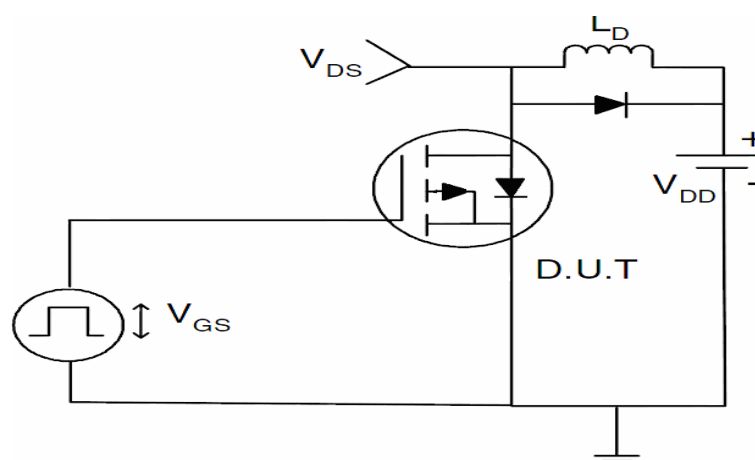
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

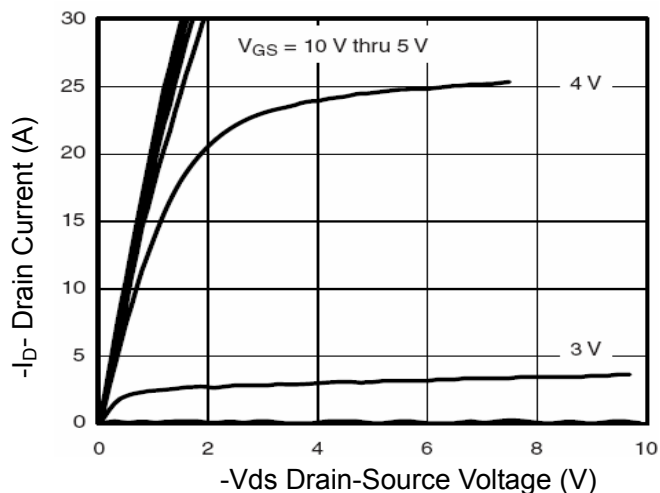


Figure 1 Output Characteristics

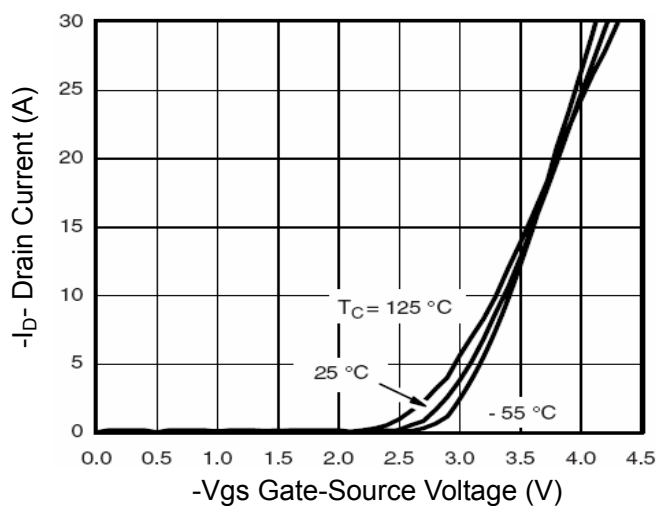


Figure 2 Transfer Characteristics

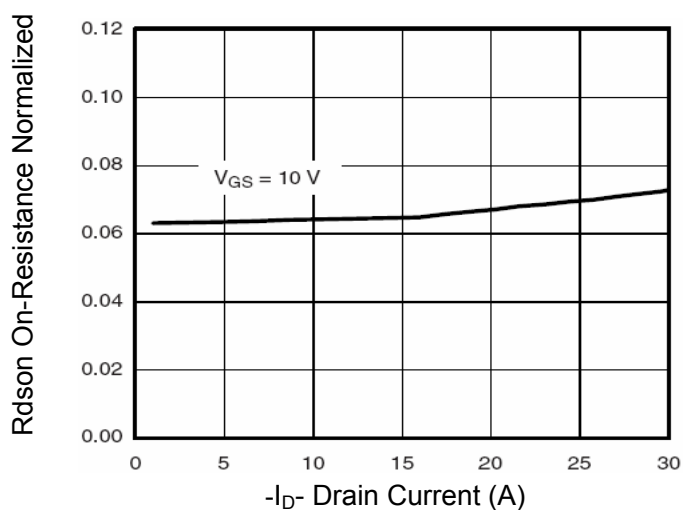


Figure 3 Rdson- Drain Current

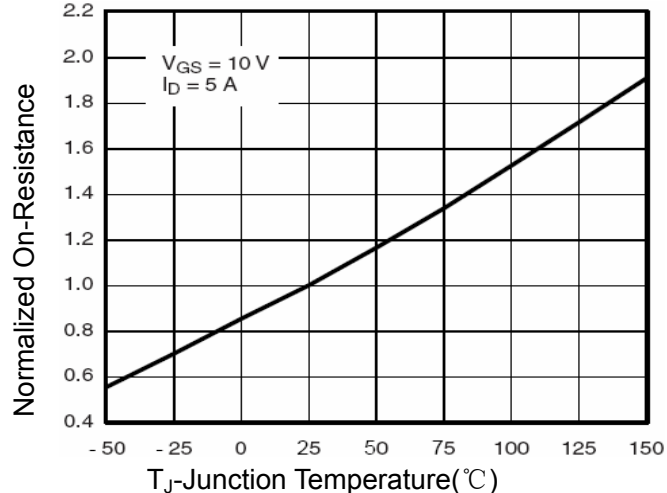


Figure 4 Rdson-Junction Temperature

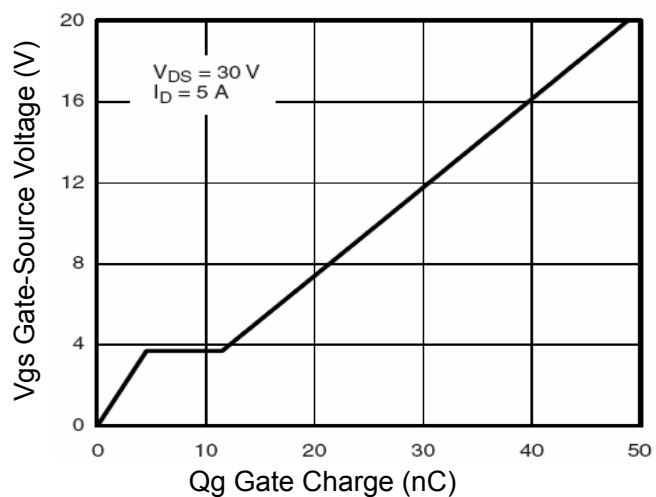


Figure 5 Gate Charge

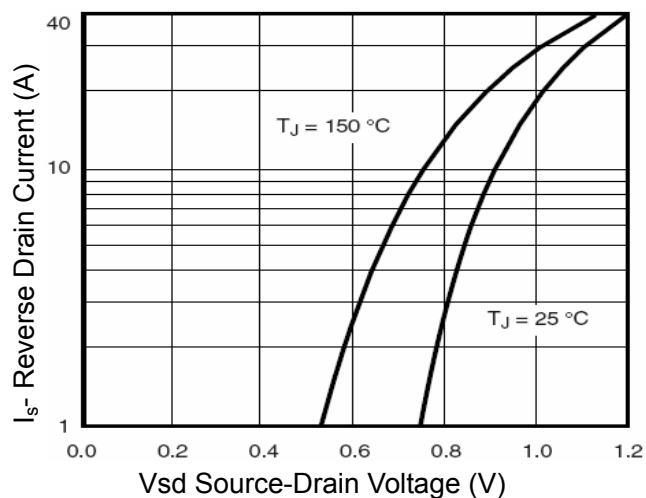


Figure 6 Source- Drain Diode Forward

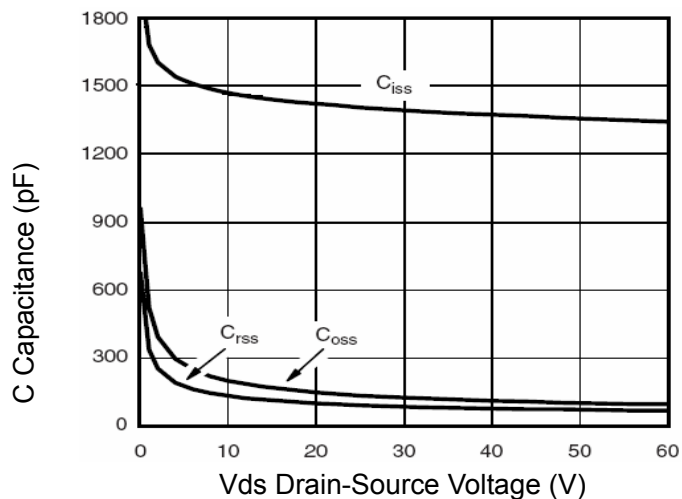


Figure 7 Capacitance vs Vds

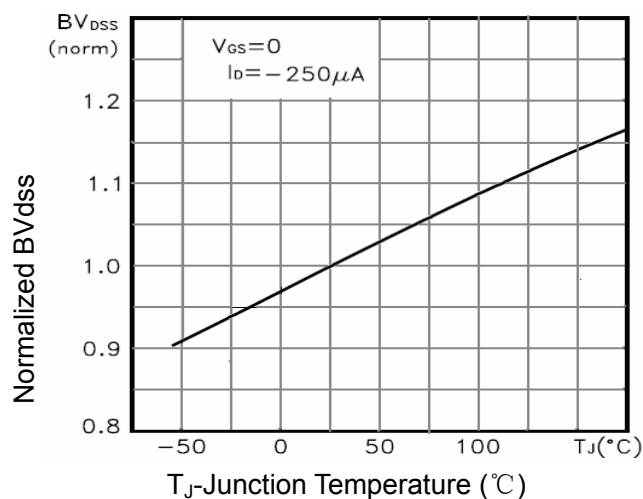


Figure 9 BV_{DSS} vs Junction Temperature

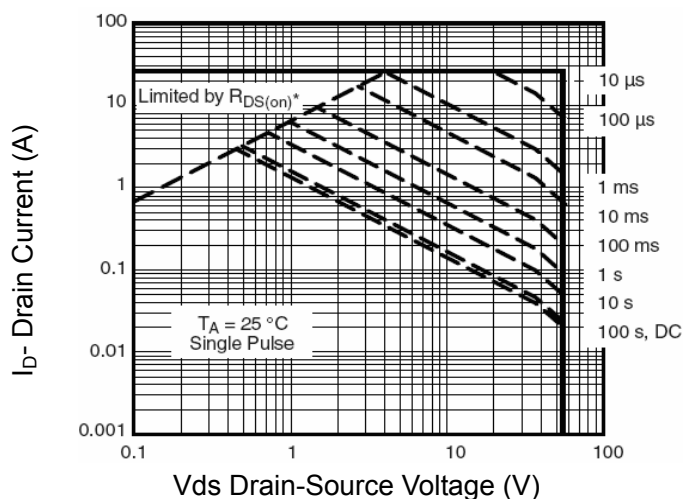


Figure 8 Safe Operation Area

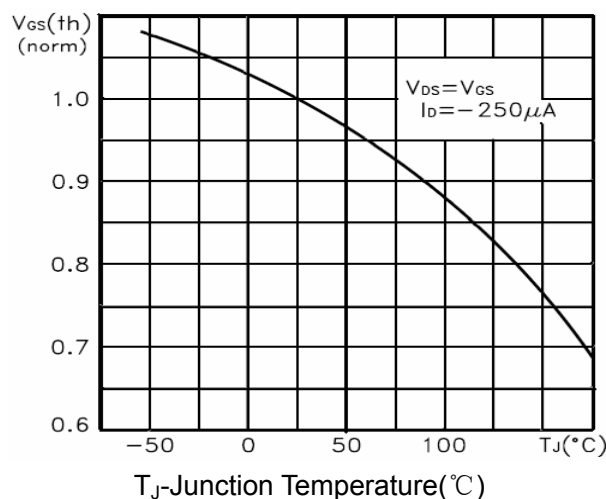


Figure 10 V_{GS(th)} vs Junction Temperature

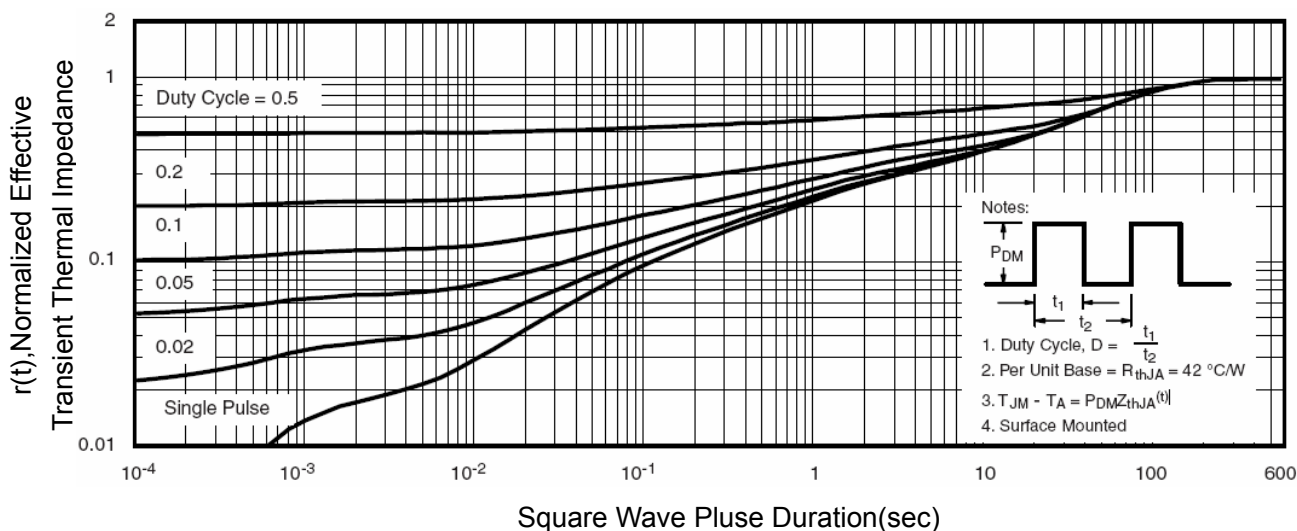
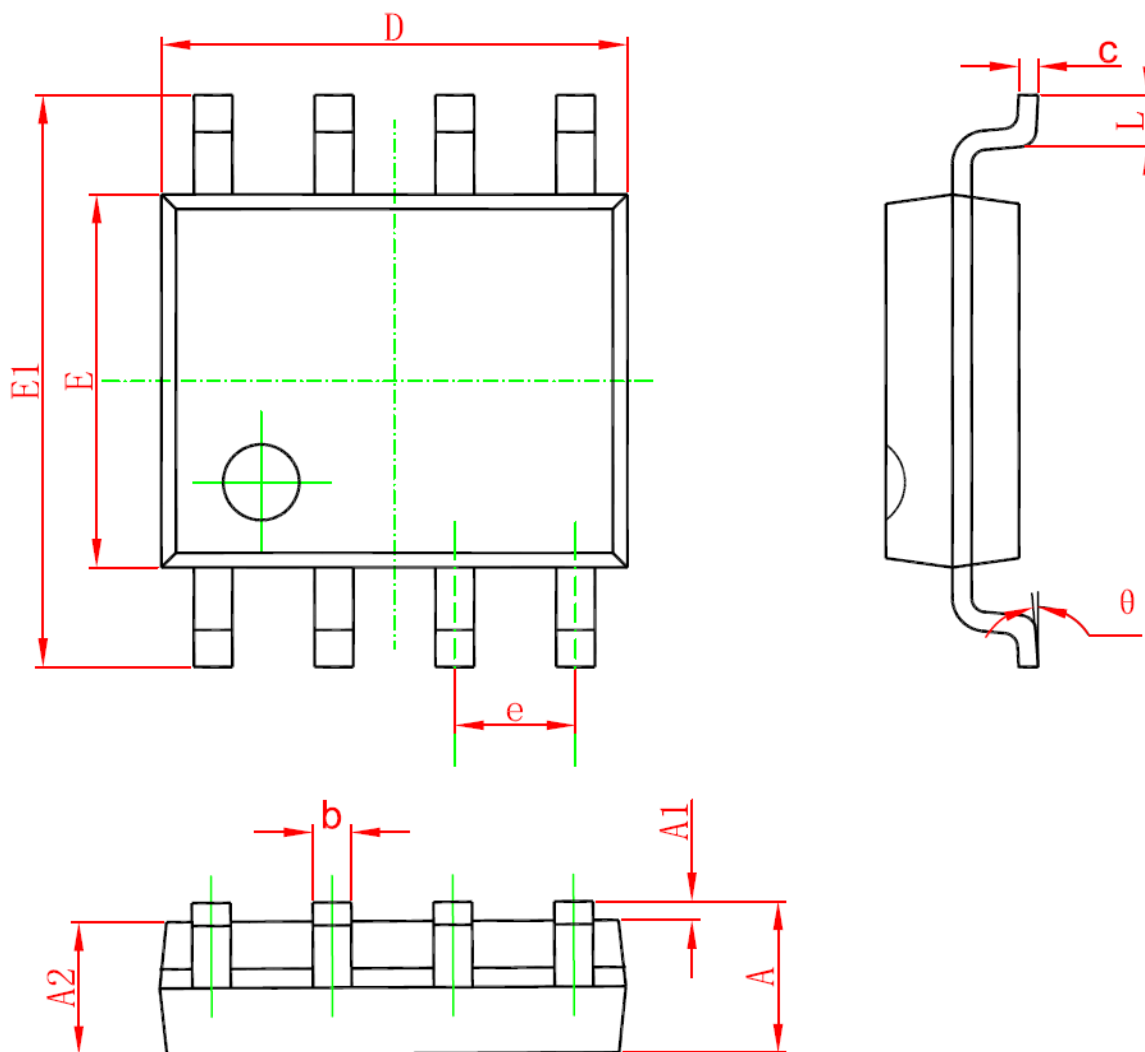


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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