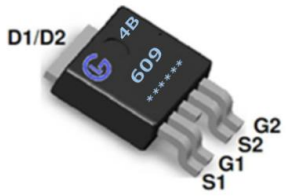
GL609-4B

GL Silicon N+P Channel Power MOSFET

General Description

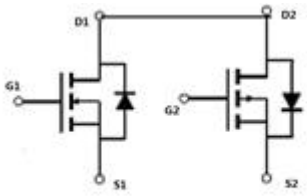
The GL609-4B uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications. The package form is TO-252-4, which accords with the RoHS standard.

TO-252-4



Features

- **N channel**
  - V_{DS}=40V,I_D=23A
  - $R_{DS(ON)}$<20mΩ @ V_{GS}=10V
  - $R_{DS(ON)}$<25mΩ @ V_{GS}=4.5V
- **P channel**
  - V_{DS} =-40V,I_D=-20A
  - $R_{DS(ON)}$<30mΩ @ V_{GS}=-10V
  - $R_{DS(ON)}$<50mΩ @ V_{GS}=-4.5V



n-channel p-channel

Application

- H-bridge
- Inverters

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	40	-40	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current	T_C=25℃	I_D	23	-20	A
	T_C=100℃		19.5	-18	
Pulsed Drain Current (Note 1)		I_{DM}	46	-40	A
Maximum Power Dissipation	T_C=25℃	P_D	40		W
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 To 150		℃

Thermal Characteristic

Parameter	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Case(Note 2)	$R_{\theta JC}$	3.1	℃/W

N-CH Electrical Characteristics (TA=25℃unless otherwise noted)

Parameter	Symbol	Condition	Rating			Unit
			Min	Typ	Max	
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	40	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V	--	--	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V,V_{DS}=0V	--	--	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1	1.5	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=12A	--	--	20	mΩ
		V_{GS}=4.5V, I_D=10A	--	--	25	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=12A	5	--	--	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=15V,V_{GS}=0V, F=1.0MHz	--	680	--	PF
Output Capacitance	C_{oss}		--	78	--	PF
Reverse Transfer Capacitance	C_{rss}		--	56	--	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V, R_L=2.5Ω V_{GS}=4.5V,R_{GEN}=3Ω	--	8.9	--	nS
Turn-on Rise Time	t_r		--	2.3	--	nS
Turn-Off Delay Time	$t_{d(off)}$		--	42	--	nS
Turn-Off Fall Time	t_f		--	2.8	--	nS
Total Gate Charge	Q_g	V_{DS}=20V,I_D=12A, V_{GS}=4.5V	--	5.6	--	nC
Gate-Source Charge	Q_{gs}		--	1.3	--	nC
Gate-Drain Charge	Q_{gd}		--	2.5	--	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=12A	--	0.9	1.4	V

P-CH Electrical Characteristics (TA=25℃unless otherwise noted)

Parameter	Symbol	Condition	Rating			Unit
			Min	Typ	Max	
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=-250μA	-40	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-40V,V_{GS}=0V	--	--	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V,V_{DS}=0V	--	--	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.0	-1.5	-2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-8A	--	--	30	mΩ
		V_{GS}=-4.5V, I_D=-4A	--	--	50	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-8A	6	--	--	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-15V,V_{GS}=0V, F=1.0MHz	--	1005	--	PF
Output Capacitance	C_{oss}		--	105	--	PF
Reverse Transfer Capacitance	C_{rss}		--	80	--	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	td(on)	V_{DD}=-20V, R_L=2.3Ω V_{GS}=-4.5V,R_{GEN}=6Ω	--	20	--	nS
Turn-on Rise Time	t_r		--	12.5	--	nS
Turn-Off Delay Time	$t_{d(off)}$		--	49.5	--	nS
Turn-Off Fall Time	t_f		--	4.8	--	nS
Total Gate Charge	Q_g	V_{DS}=-20V,I_D=-12A V_{GS}=-4.5V	--	10	--	nC
Gate-Source Charge	Q_{gs}		--	2.6	--	nC
Gate-Drain Charge	Q_{gd}		--	3.2	--	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-8A	--	--	-1.4	V

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%.

Characteristics Curves

N- Channel Typical Electrical and Thermal Characteristics (Curves)

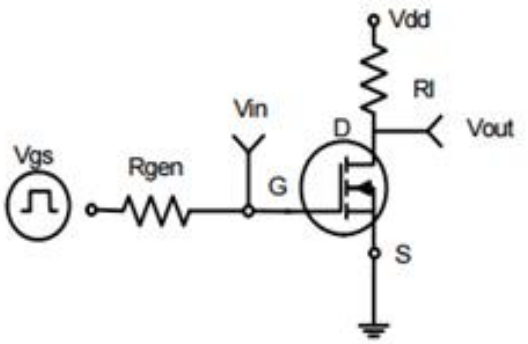


Figure 1:Switching Test Circuit

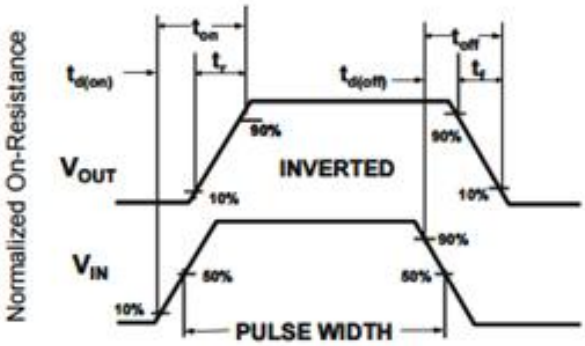


Figure 2:Switching Waveforms

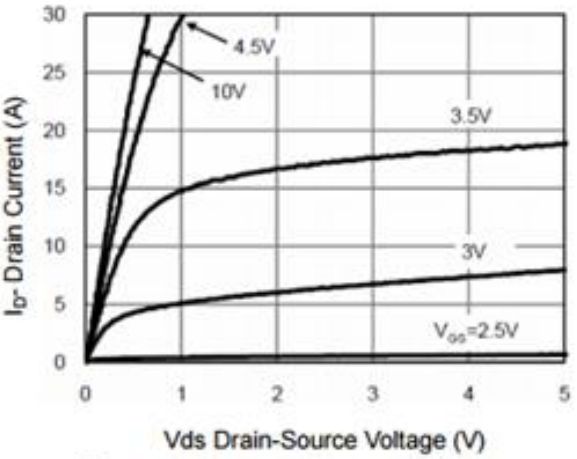


Figure 3 Output Characteristics

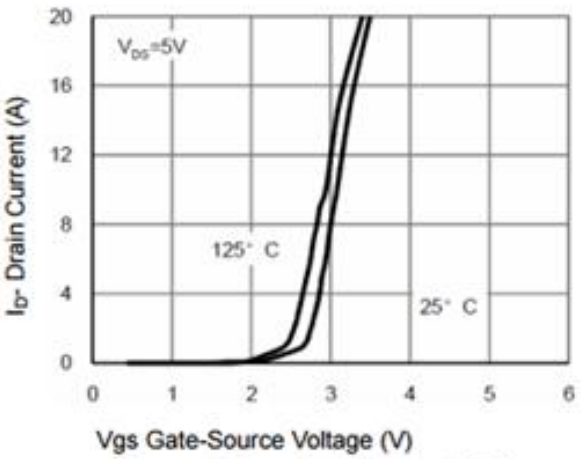


Figure 4 Transfer Characteristics

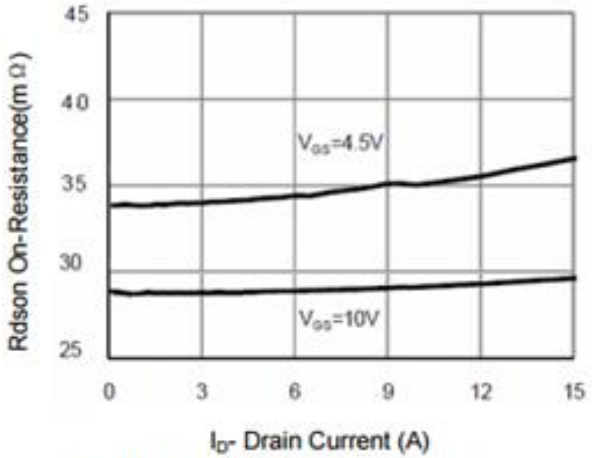


Figure 5 Drain-Source On-Resistance

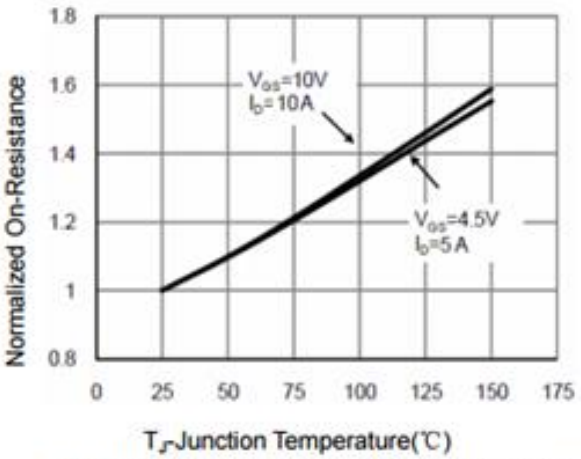


Figure 6 Drain-Source On-Resistance

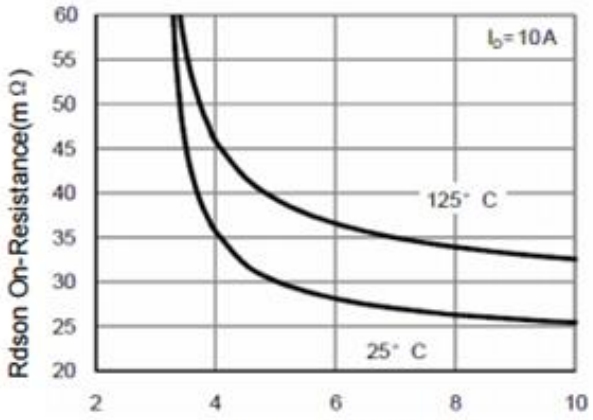


Figure7 Rdson vs Vgs

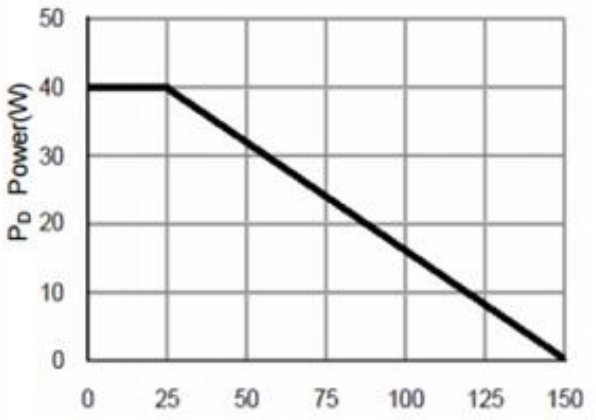


Figure 8 Power Dissipation

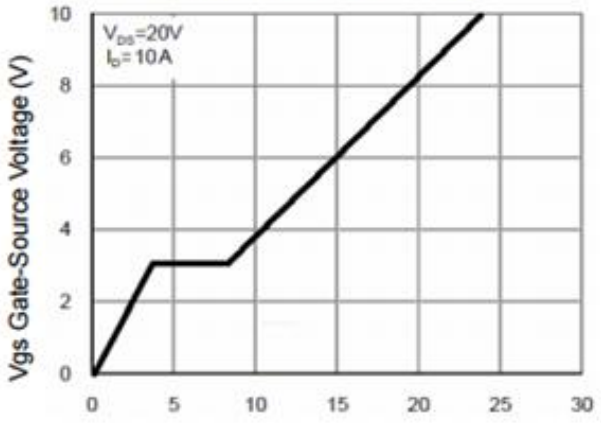


Figure 9 Gate Charge

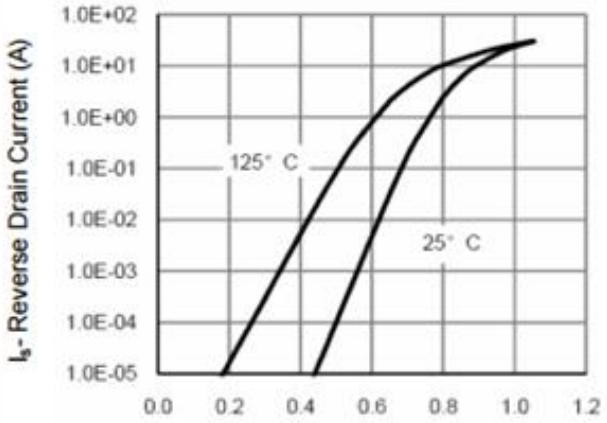


Figure 10 Source- Drain Diode Forward

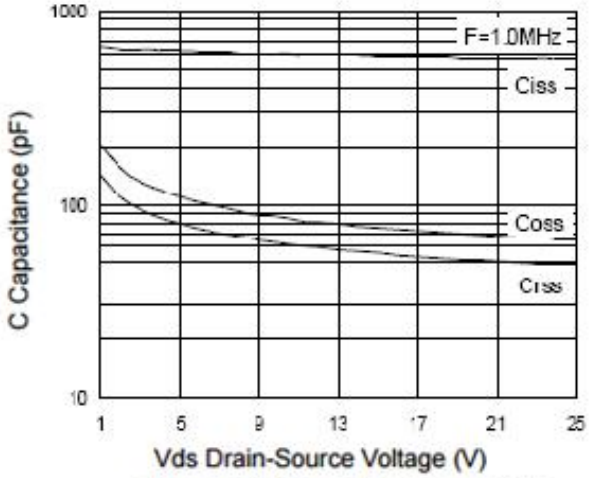


Figure 11 Capacitance vs Vds

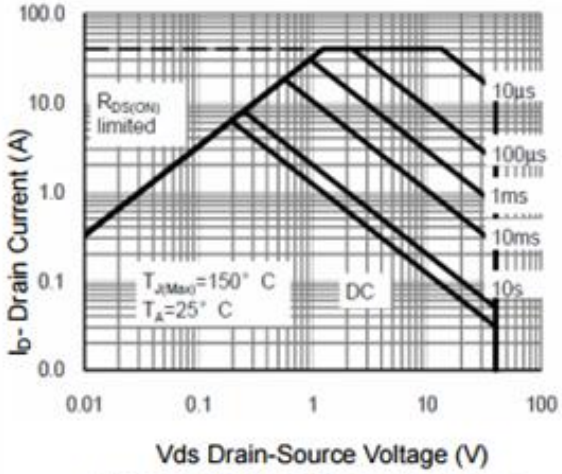


Figure 12 Safe Operation Area

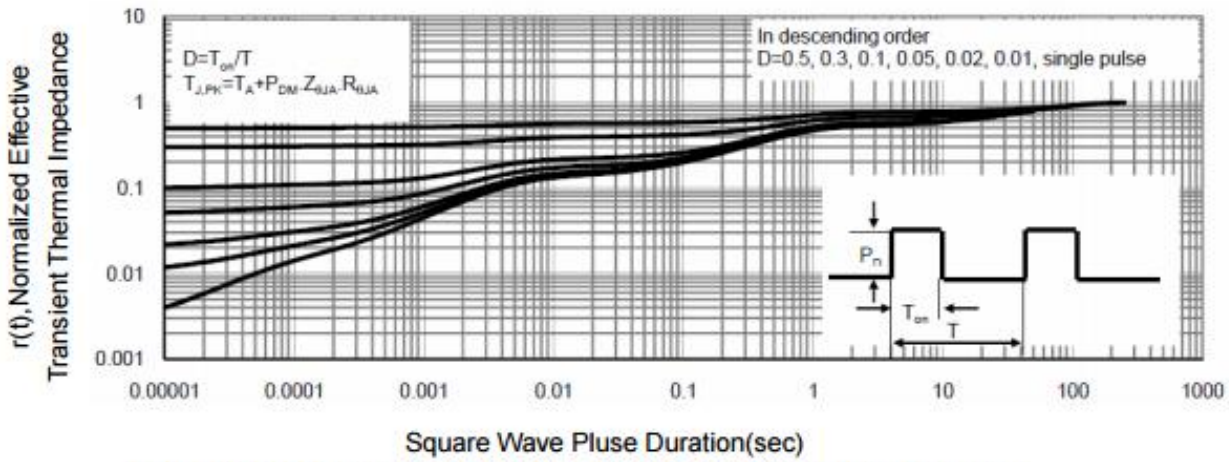


Figure 13 Normalized Maximum Transient Thermal Impedance

P- Channel Typical Electrical and Thermal Characteristics (Curves)

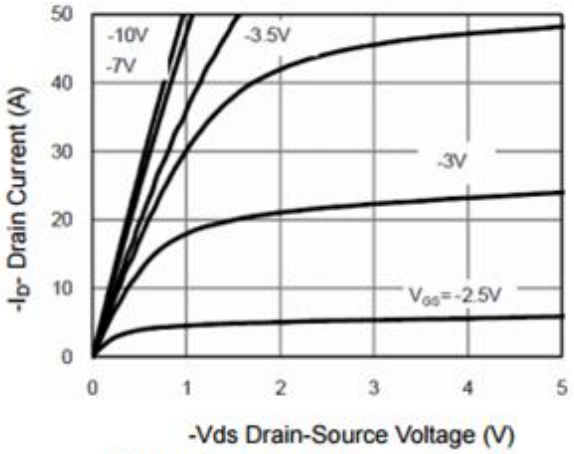


Figure 1 Output Characteristics

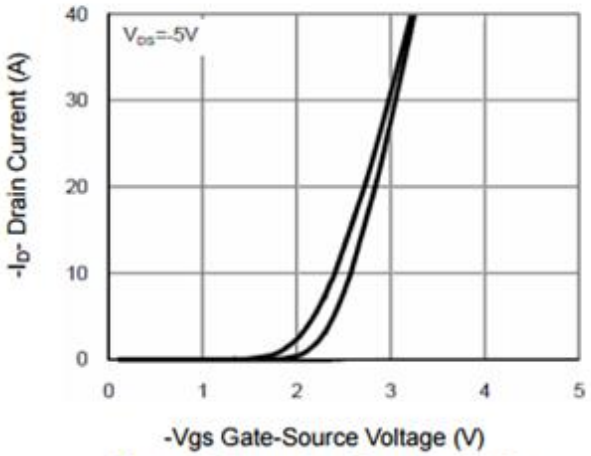


Figure 2 Transfer Characteristics

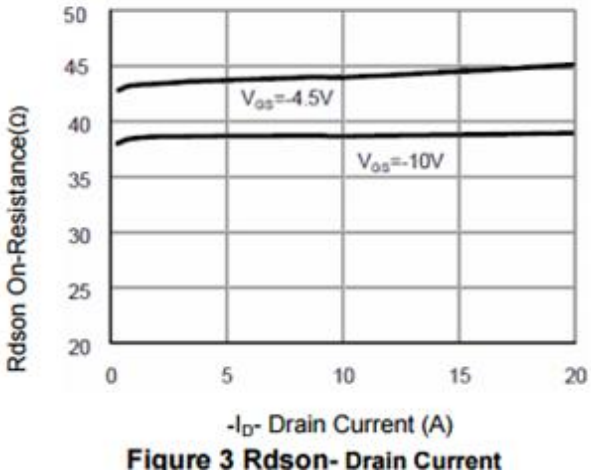


Figure 3 Rdson- Drain Current

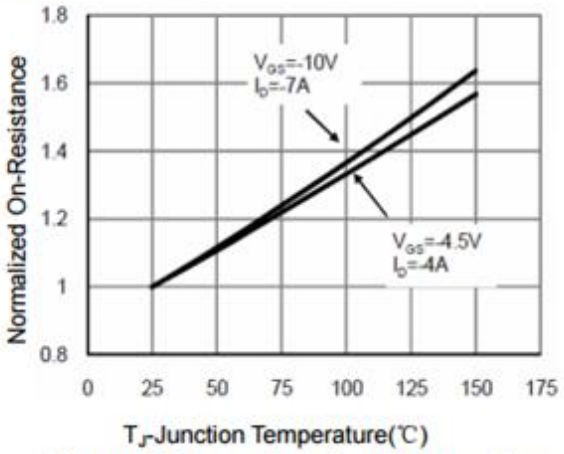


Figure 4 Rdson-Junction Temperature

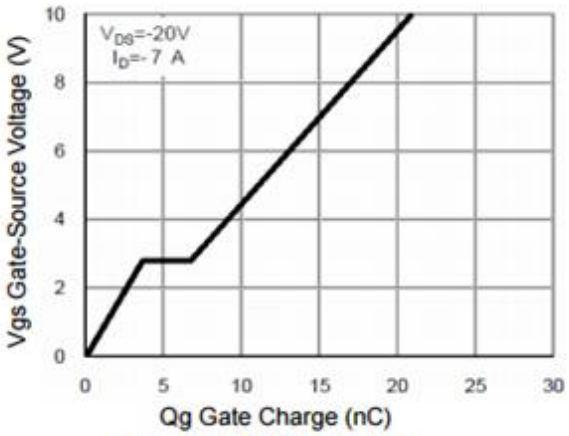


Figure 5 Gate Charge

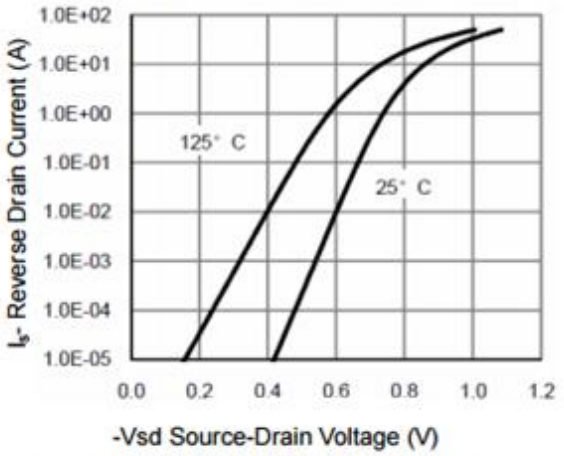
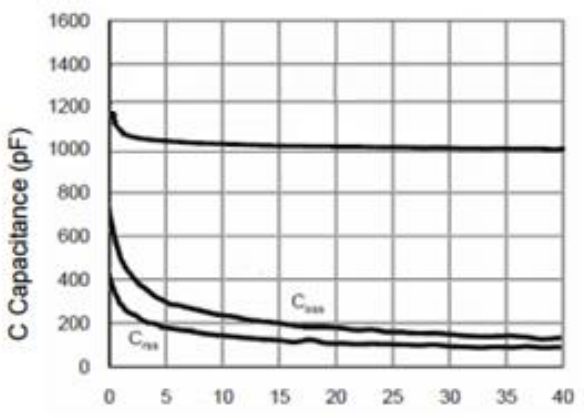
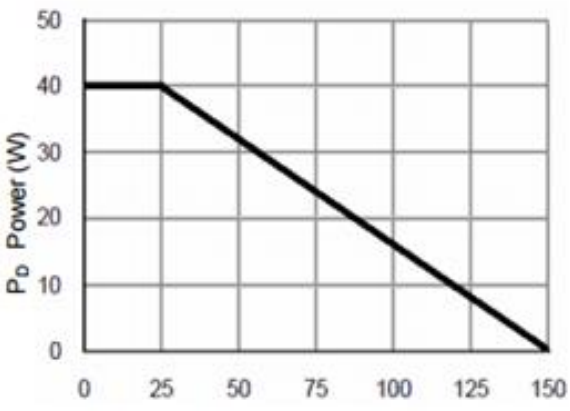


Figure 6 Source- Drain Diode Forward



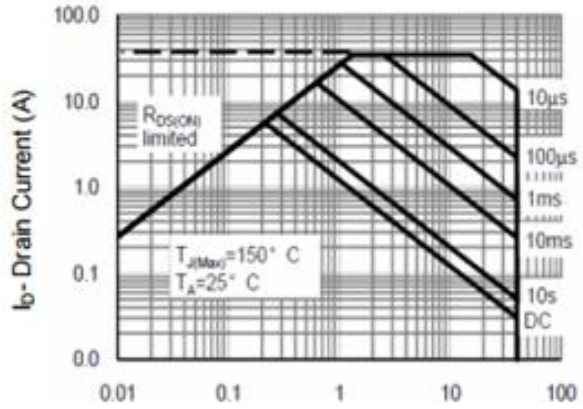
-Vds Drain-Source Voltage (V)

Figure 7 Capacitance vs Vds



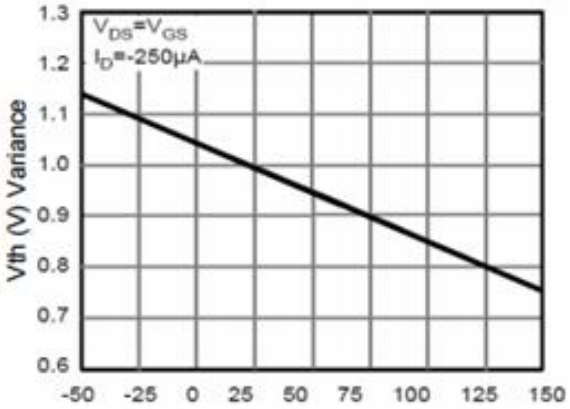
T_J-Junction Temperature(℃)

Figure 9 Power Dissipation



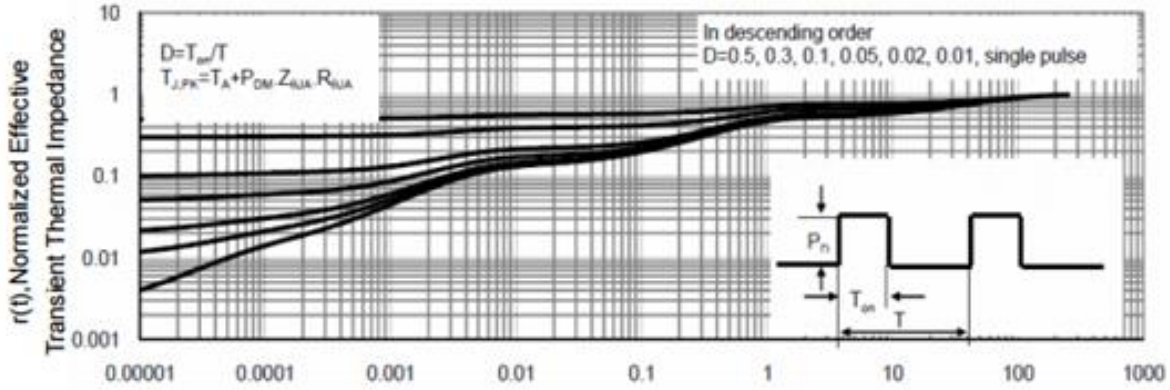
-Vds Drain-Source Voltage (V)

Figure 8 Safe Operation Area



T_J-Junction Temperature(℃)

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



Square Wave Pluse Duration(sec)

Figure 11 Normalized Maximum Transient Thermal Impedance