



GL12NP03-4

GL Silicon N+P Channel Power MOSFET

General Description:

The GL12NP03-4 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications. The package form is TO-252-5, which accords with the RoHS standard.

Features:

- **General Features N channel**

- VDS =30V, ID =12A
- RDS(ON) <25mΩ @ VGS=10V
- RDS(ON) <35mΩ @ VGS=4.5V

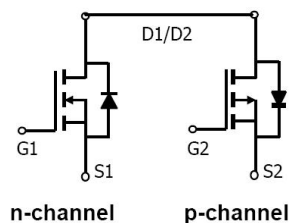
- **p channel**

- VDS =-30V, ID =-12A
 - RDS(ON) <37mΩ @ VGS=-10V
 - RDS(ON) <65mΩ @ VGS=-4.5V

Application

- H-bridge
- Inverters

TO-252-5 top view



Absolute Maximum Ratings (T_C=25°C unless otherwise noted)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V _{DS}	30	-30	V
Gate-Source Voltage		V _{GS}	±20	±20	V
Continuous Drain Current	T _C =25 °C	I _D	12	-12	A
	T _C =100 °C		8.4	-8.4	
Pulsed Drain Current (Note 1)		I _{DM}	36	-36	A
Maximum Power Dissipation	T _C =25 °C	P _D	25		W
Operating Junction and Storage Temperature Range		T _J , T _{STG}	-55 To 150		°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	R _{θJC}	5	°C/W
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N-Channel Electrical Characteristics (T_c=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	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 ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	1.0	1.7	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =12A	-	20	25	mΩ
		V _{GS} =4.5V, I _D =5A	-	27	35	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =12A	-	25	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{ISS}	V _{DS} =15V,V _{GS} =0V, F=1.0MHz	-	1040	-	PF
Output Capacitance	C _{OSS}		-	180	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	110	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =15V ,R _L =2.5Ω V _{GS} =10V,R _G =3Ω	-	4.5	-	nS
Turn-on Rise Time	t _r		-	4.0	-	nS
Turn-Off Delay Time	t _{d(off)}		-	17.5	-	nS
Turn-Off Fall Time	t _f		-	3.2	-	nS
Total Gate Charge	Q _g	V _{DS} =15V,I _D =12A, V _{GS} =10V	-	20		nC
Gate-Source Charge	Q _{gs}		-	2.5		nC
Gate-Drain Charge	Q _{gd}		-	3.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V,I _S =12A	-		1.5	V
Diode Forward Current ^(Note 2)	I _S		-	-	12	A
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF =12A di/dt = 100A/μs ^(Note3)	-	19	-	nS
Reverse Recovery Charge	Q _{rr}		-	8	-	nC

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P-Channel Electrical Characteristics (T_c=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	-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 ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =-250μA	-1.0	-1.8	-2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-12A	-	30	37	mΩ
		V _{GS} =-4.5V, I _D =-5A		50	65	
Forward Transconductance	g _{FS}	V _{DS} =-5V,I _D =-12A	-	17	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{ISS}	V _{DS} =-15V,V _{GS} =0V, F=1.0MHz	-	920	-	PF
Output Capacitance	C _{OSS}		-	190	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	120	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-15V ,R _L =2.5Ω V _{GS} =-10V,R _G =3Ω	-	9	-	nS
Turn-on Rise Time	t _r		-	25	-	nS
Turn-Off Delay Time	t _{d(off)}		-	20	-	nS
Turn-Off Fall Time	t _f		-	12	-	nS
Total Gate Charge	Q _g	V _{DS} =-15V,I _D =-12A, V _{GS} =-10V	-	19		nC
Gate-Source Charge	Q _{gs}		-	2.5		nC
Gate-Drain Charge	Q _{gd}		-	5.5		nC



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Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$V_{GS}=0V, I_S=-12A$	-		-1.5	V
Diode Forward Current ^(Note 2)	I_S		-	-	-12	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}C, I_F = -12A$ $di/dt = 100A/\mu s$ ^(Note3)	-	21	-	nS
Reverse Recovery Charge	Q_{rr}		-	8	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition: $T_J=25^{\circ}C, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

◆ Typical Characteristics(N-Channel)

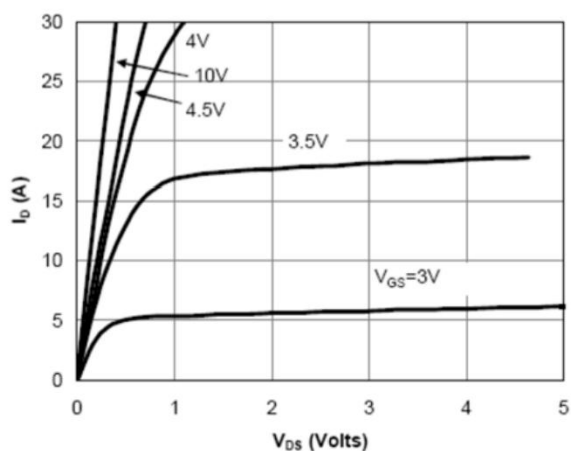


Fig 1: On-Region Characteristics

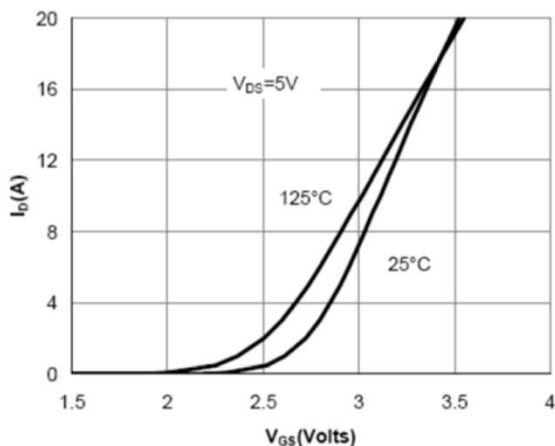


Figure 2: Transfer Characteristics

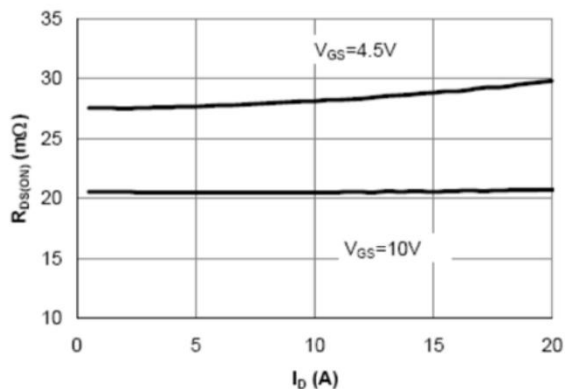


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

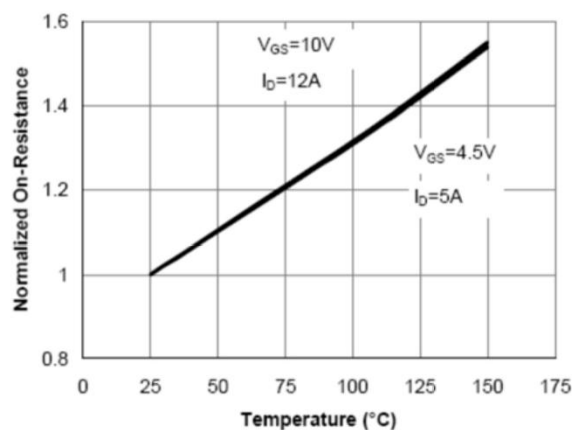


Figure 4: On-Resistance vs. Junction Temperature

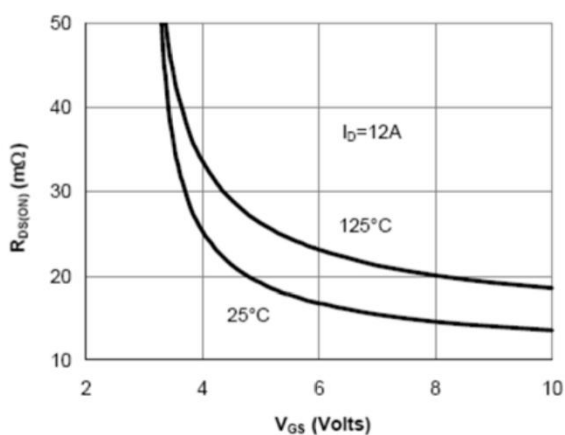


Figure 5: On-Resistance vs. Gate-Source Voltage

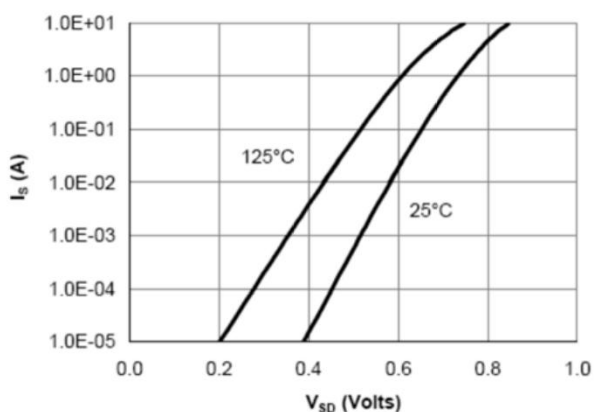


Figure 6: Body-Diode Characteristics

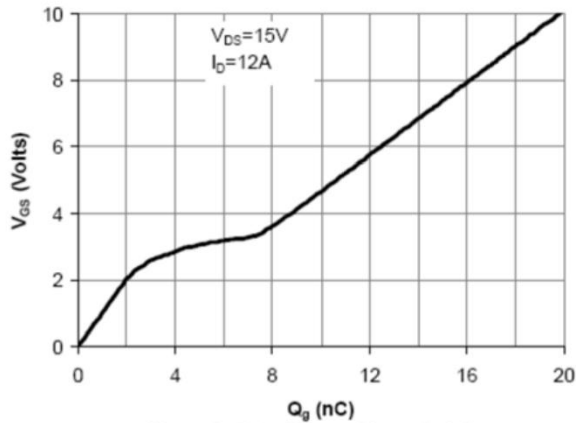


Figure 7: Gate-Charge Characteristics

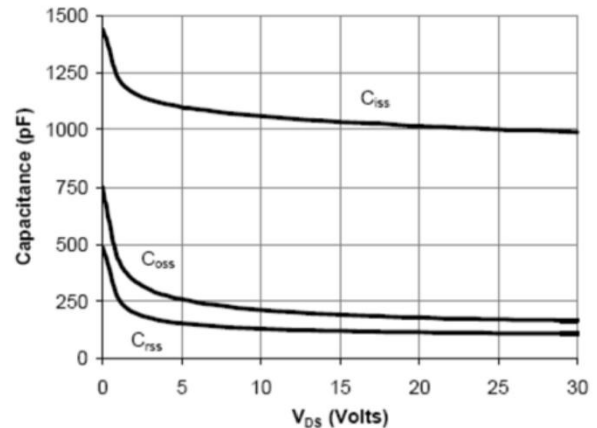


Figure 8: Capacitance Characteristics

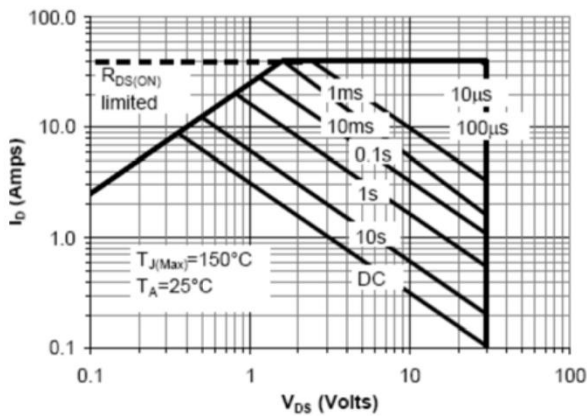


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

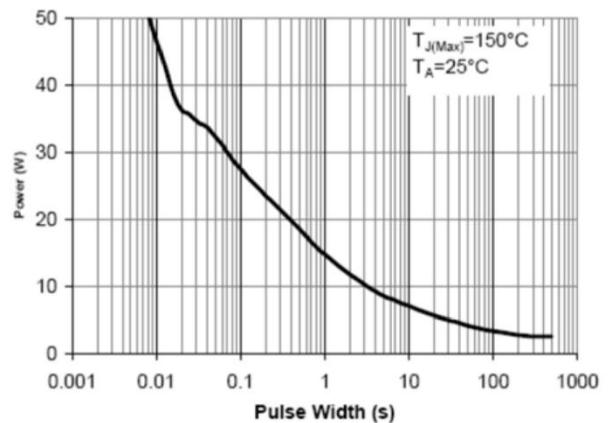


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

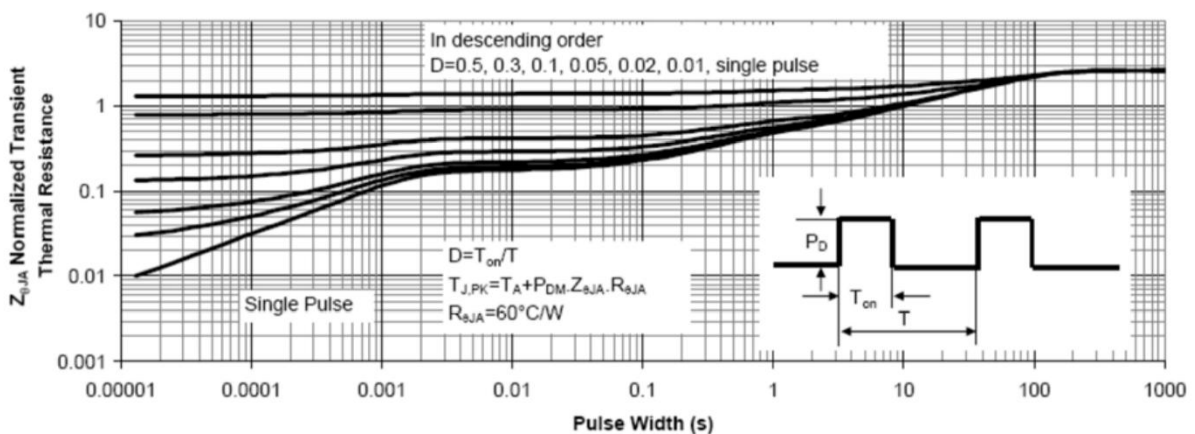


Figure 11: Normalized Maximum Transient Thermal Impedance



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◆ Typical Characteristics(P-Channel)

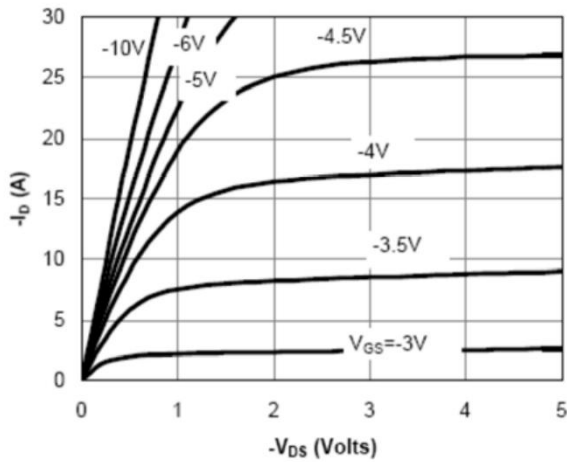


Fig 1: On-Region Characteristics

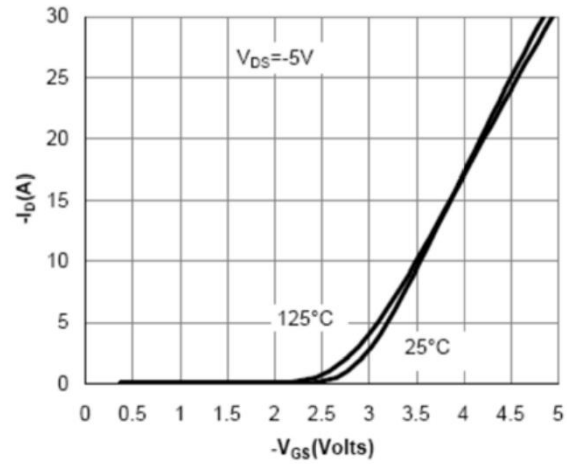


Figure 2: Transfer Characteristics

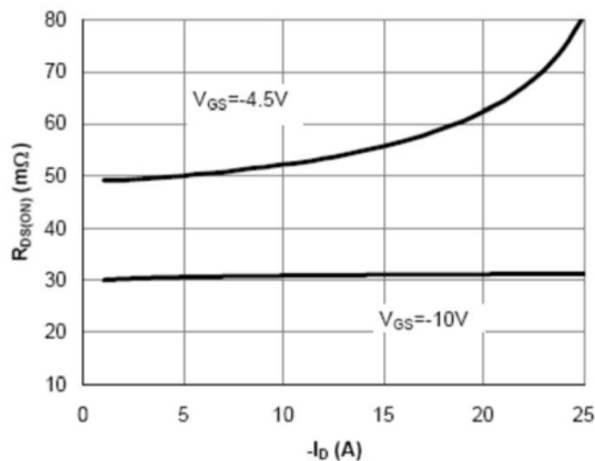


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

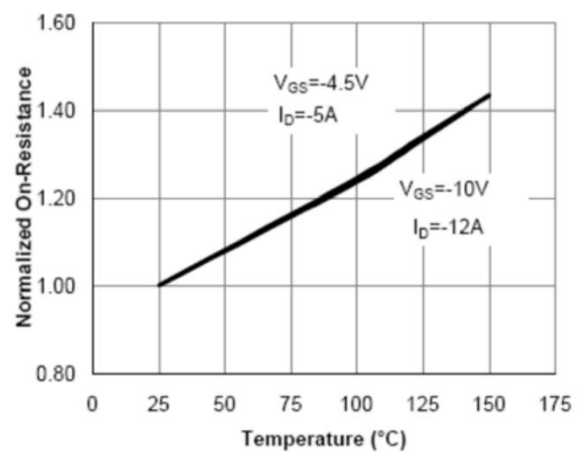


Figure 4: On-Resistance vs. Junction Temperature

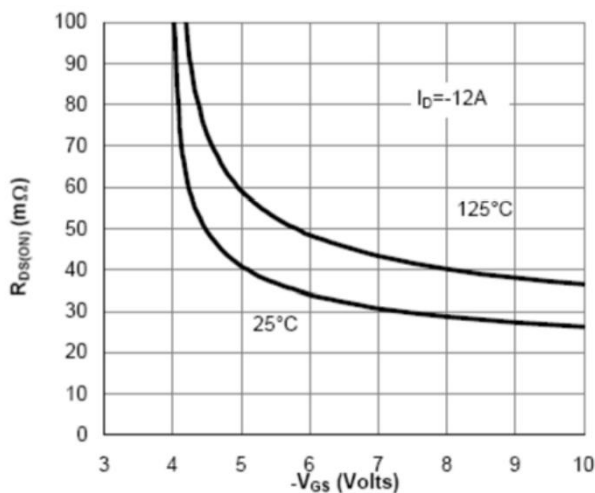


Figure 5: On-Resistance vs. Gate-Source Voltage

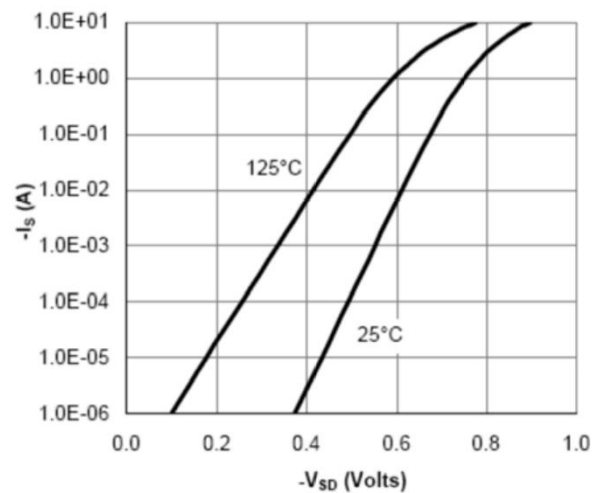


Figure 6: Body-Diode Characteristics

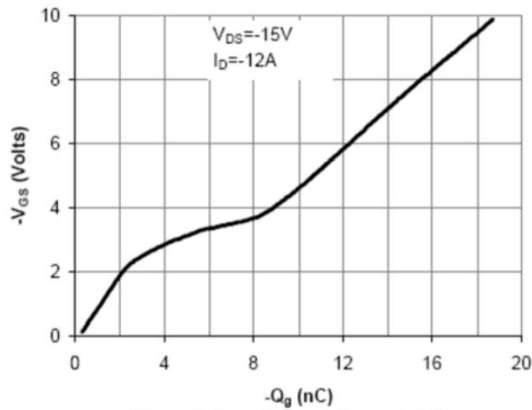


Figure 7: Gate-Charge Characteristics

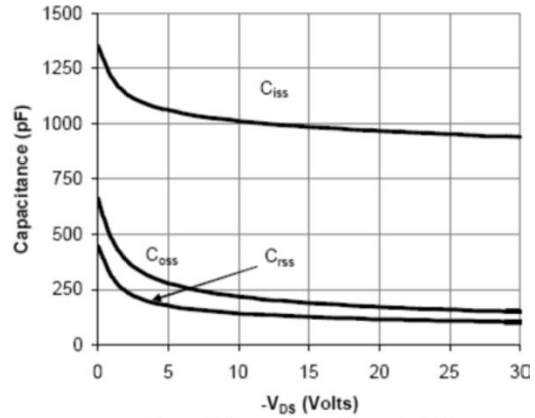


Figure 8: Capacitance Characteristics

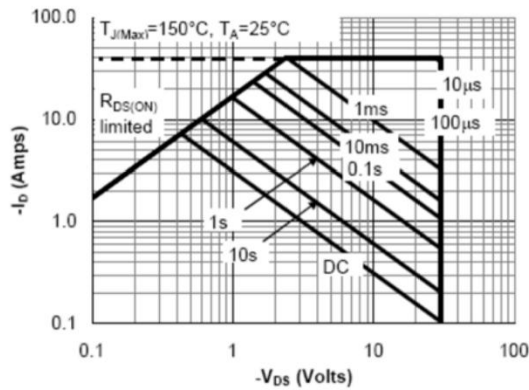


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

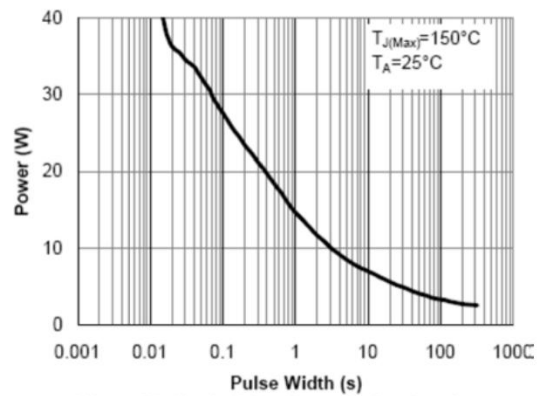


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

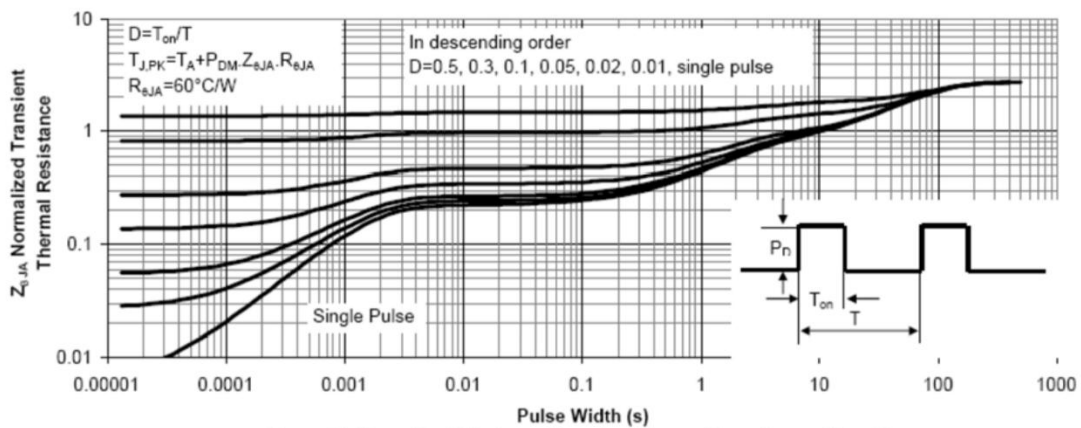


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)