

Complementary MOSFET

ELM14614AA-N

■ General Description

ELM14614AA-N uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

■ Features

- | | |
|---|--|
| N-channel | P-channel |
| • $V_{ds}=40V$ | $V_{ds}=-40V$ |
| • $I_d=6A(V_{gs}=10V)$ | $I_d=-5A(V_{gs}=-10V)$ |
| • $R_{ds(on)} < 31m\Omega(V_{gs}=10V)$ | $R_{ds(on)} < 45m\Omega(V_{gs}=-10V)$ |
| • $R_{ds(on)} < 45m\Omega(V_{gs}=4.5V)$ | $R_{ds(on)} < 63m\Omega(V_{gs}=-4.5V)$ |

■ Maximum Absolute Ratings

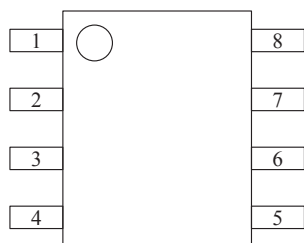
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note	
Drain-source voltage	V_{ds}	40	-40	V		
Gate-source voltage	V_{gs}	± 20	± 20	V		
Continuous drain current	I_d	Ta=25°C	6.0	-5.0	A	1
		Ta=70°C	5.0	-4.0		
		Ta=85°C	4.5	-3.8		
Pulsed drain current	I_{dm}	20	-20	A	2	
Avalanche current	I_{ar}	12	14	A		
Single pulse avalanche energy L=0.3mH	E_{as}	22	29	mJ		
Power dissipation	P_d	Ta=25°C	2.00	2.00	W	
		Ta=70°C	1.28	1.28		
		Ta=85°C	1.05	1.05		
Junction and storage temperature range	T_j, T_{stg}	-55 to 150	-55 to 150	°C		

■ Thermal Characteristics

Parameter	Symbol	Device	Typ.	Max.	Unit	Note	
Maximum junction-to-ambient	$R_{\theta ja}$	N-ch	$t \leq 10s$	48.0	62.5	°C/W	1
Maximum junction-to-ambient			Steady-state	74.0	110.0	°C/W	
Maximum junction-to-lead	$R_{\theta jl}$		Steady-state	35.0	50.0	°C/W	3
Maximum junction-to-ambient	$R_{\theta ja}$	P-ch	$t \leq 10s$	48.0	62.5	°C/W	1
Maximum junction-to-ambient			Steady-state	74.0	110.0	°C/W	
Maximum junction-to-lead	$R_{\theta jl}$		Steady-state	35.0	50.0	°C/W	3

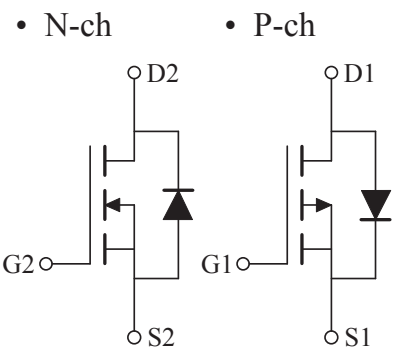
■ Pin configuration

SOP-8(TOP VIEW)



Pin No.	Pin name
1	SOURCE2
2	GATE2
3	SOURCE1
4	GATE1
5	DRAIN1
6	DRAIN1
7	DRAIN2
8	DRAIN2

■ Circuit



Complementary MOSFET

ELM14614AA-N

■ Electrical Characteristics (N-ch)

Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	I _d =10mA, V _{gs} =0V	40			V	
Zero gate voltage drain current	I _{dss}	V _{ds} =32V V _{gs} =0V			1	μA	
			T _j =55°C		5		
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±20V			±100	nA	
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250μA	1.5	2.3	3.0	V	
On state drain current	I _{d(on)}	V _{gs} =10V, V _{ds} =5V	20			A	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V I _d =6A		23.2	31.0	mΩ	
			T _j =125°C	36.0	48.0		
			V _{gs} =4.5V, I _d =5A	32.6	45.0		
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =6A		22		S	
Diode forward voltage	V _{sd}	I _s =1A, V _{gs} =0V		0.77	1.00	V	
Max.body-diode continuous current	I _s				2.5	A	
Pulsed body-diode current	I _{sm}				20	A	2
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =20V, f=1MHz		404	500	pF	
Output capacitance	C _{oss}			95	120	pF	
Reverse transfer capacitance	C _{rss}			37	50	pF	
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		2.7	4.0	Ω	
SWITCHING PARAMETERS							
Total gate charge (10V)	Q _g	V _{gs} =10V, V _{ds} =20V I _d =6A		8.3	10.0	nC	
Total gate charge (4.5V)	Q _g			4.2	5.1	nC	
Gate-source charge	Q _{gs}			1.3	2.0	nC	
Gate-drain charge	Q _{gd}			2.3	3.0	nC	
Turn-on delay time	t _{d(on)}	V _{gs} =10V, V _{ds} =20V R _l =3.3Ω, R _{gen} =3Ω		4.2	5.5	ns	
Turn-on rise time	t _r			3.3	4.5	ns	
Turn-off delay time	t _{d(off)}			15.6	21.0	ns	
Turn-off fall time	t _f			3.0	4.0	ns	
Body-diode reverse recovery time	t _{rr}	I _f =6A, dI/dt=100A/μs		20.5	27.0	ns	
Body-diode reverse recovery charge	Q _{rr}	I _f =6A, dI/dt=100A/μs		14.5	19.0	nC	

NOTE :

1. The value of R_{θja} is measured with the device mounted on 1in² FR-4 board of 2oz. Copper, in still air environment with Ta=25°C. The value in any given applications depends on the user's specific board design, The current rating is based on the t ≤ 10s thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The R_{θja} is the sum of the thermal impedance from junction to lead R_{θjl} and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5%max.
5. These tests are performed with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with Ta=25°C. The SOA curve provides a single pulse rating.

Complementary MOSFET

ELM14614AA-N

■ Typical Electrical and Thermal Characteristics (N-ch)

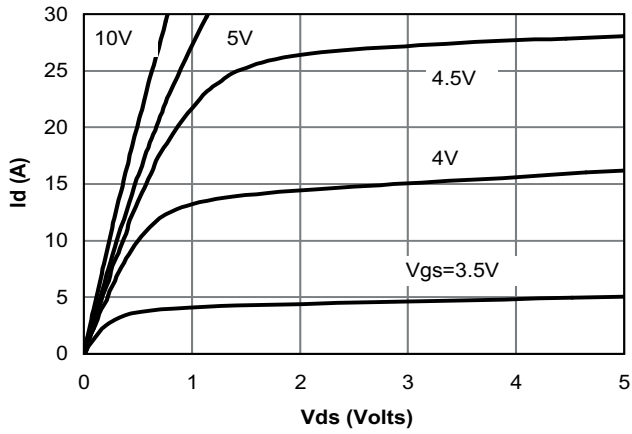


Fig 1: On-Region Characteristics

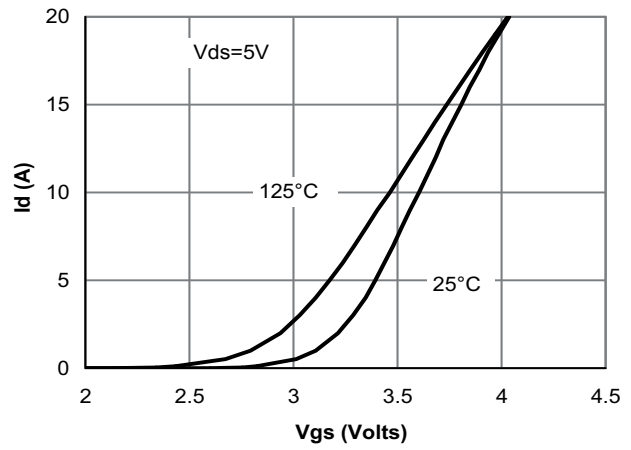


Figure 2: Transfer Characteristics

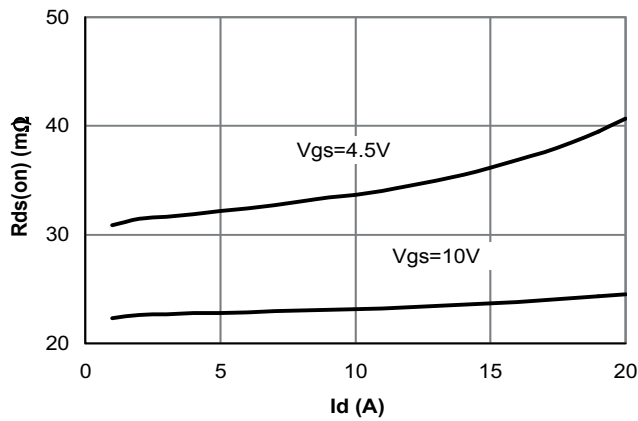


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

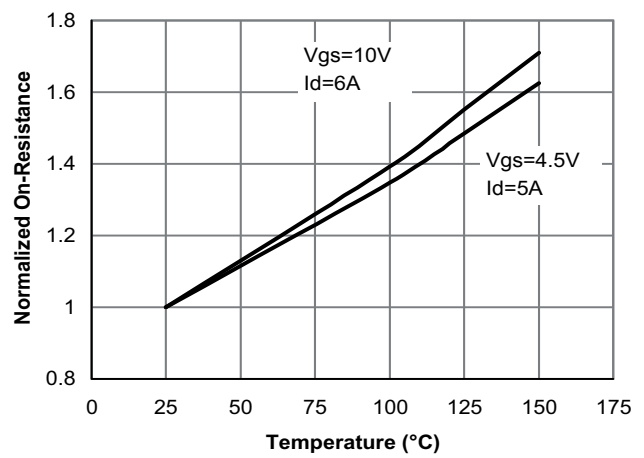


Figure 4: On-Resistance vs. Junction Temperature

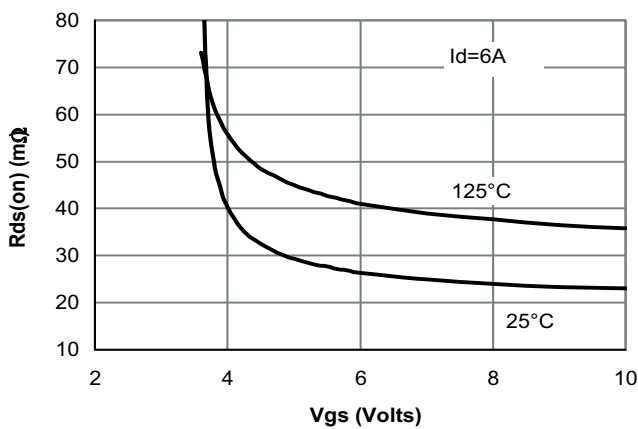


Figure 5: On-Resistance vs. Gate-Source Voltage

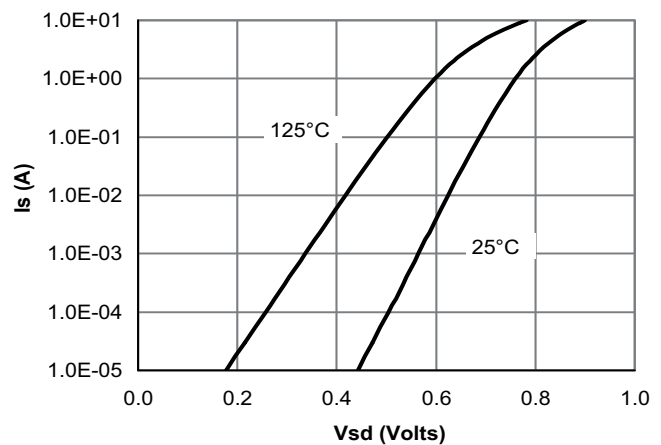


Figure 6: Body-Diode Characteristics

Complementary MOSFET

ELM14614AA-N

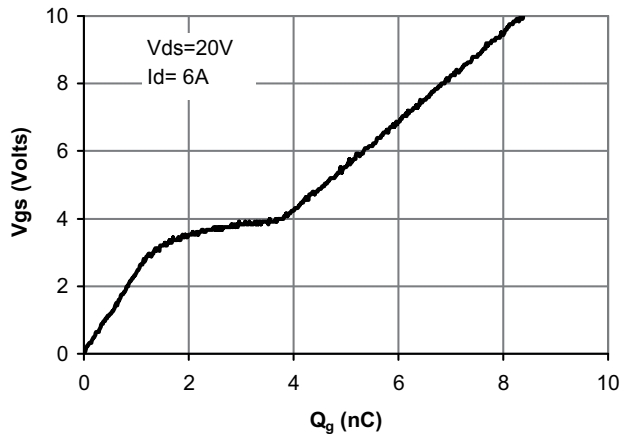


Figure 7: Gate-Charge Characteristics

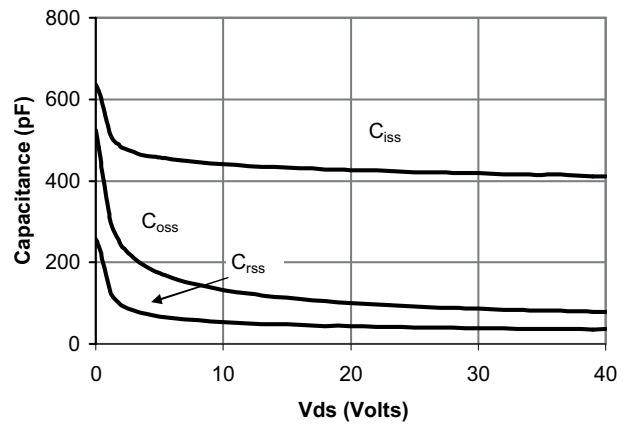


Figure 8: Capacitance Characteristics

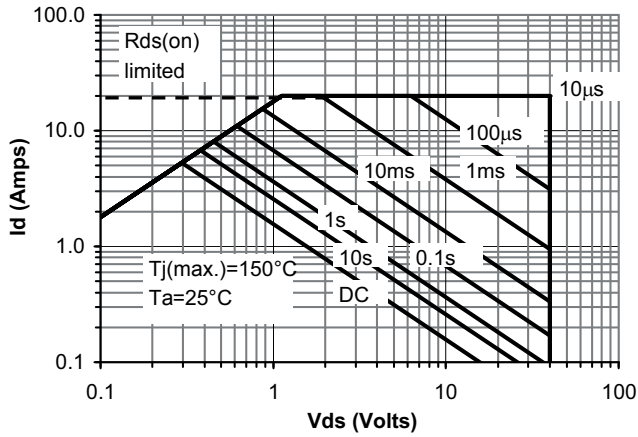


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

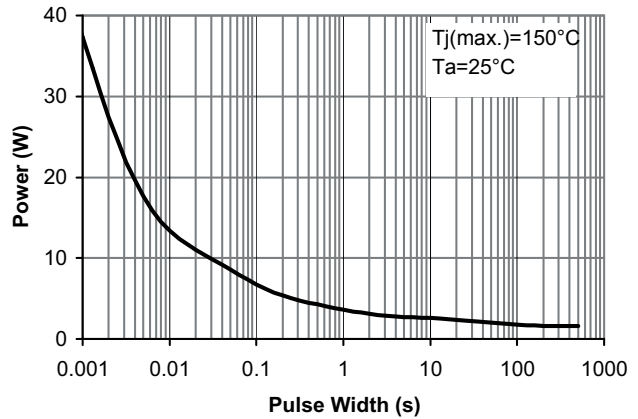


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

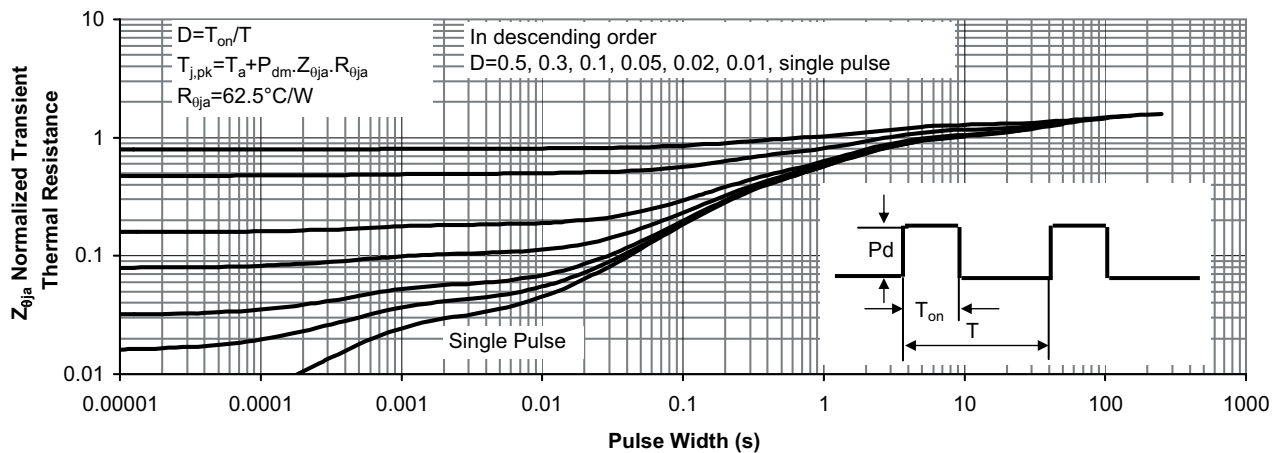


Figure 11: Normalized Maximum Transient Thermal Impedance

Complementary MOSFET

ELM14614AA-N

■ Electrical Characteristics (P-ch)

Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	I _d =-10mA, V _{gs} =0V	-40			V	
Zero gate voltage drain current	I _{dss}	V _{ds} =-32V			-1	μA	
		V _{gs} =0V	T _j =55°C		-5		
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±20V			±100	nA	
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =-250μA	-1.5	-1.9	-3.0	V	
On state drain current	I _{d(on)}	V _{gs} =-10V, V _{ds} =-5V	-20			A	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =-10V		34.7	45.0	mΩ	
		I _d =-5A	T _j =125°C	52.0	65.0		
		V _{gs} =-4.5V, I _d =-2A		50.6	63.0	mΩ	
Forward transconductance	G _{fs}	V _{ds} =-5V, I _d =-4.8A		12		S	
Diode forward voltage	V _{sd}	I _s =-1A, V _{gs} =0V		-0.75	-1.00	V	
Max. body-diode continuous current	I _s				-2.5	A	
Pulsed body-diode current	I _{sm}				-20	A	2
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =-20V f=1MHz		657	870	pF	
Output capacitance	C _{oss}			143	200	pF	
Reverse transfer capacitance	C _{rss}			63	110	pF	
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		6.5	10.0	Ω	
SWITCHING PARAMETERS							
Total gate charge (10V)	Q _g	V _{gs} =-10V, V _{ds} =-20V I _d =-5A		13.6	17.0	nC	
Total gate charge (4.5V)	Q _g			6.8	8.5	nC	
Gate-source charge	Q _{gs}			1.8	2.5	nC	
Gate-drain charge	Q _{gd}			3.9	5.0	nC	
Turn-on delay time	t _{d(on)}	V _{gs} =-10V, V _{ds} =-20V R _l =4Ω, R _{gen} =3Ω		7.5	10.0	ns	
Turn-on rise time	t _r			6.7	9.0	ns	
Turn-off delay time	t _{d(off)}			26.0	34.0	ns	
Turn-off fall time	t _f			11.2	15.0	ns	
Body diode reverse recovery time	t _{rr}	I _f =-5A, dI/dt=100A/μs		22.3	29.0	ns	
Body diode reverse recovery charge	Q _{rr}	I _f =-5A, dI/dt=100A/μs		15.2	20.0	nC	

NOTE :

1. The value of R_{θja} is measured with the device mounted on 1in² FR-4 board of 2oz. Copper, in still air environment with Ta=25°C. The value in any given applications depends on the user's specific board design, The current rating is based on the t ≤ 10s thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The R_{θja} is the sum of the thermal impedance from junction to lead R_{θjl} and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5%max.
5. These tests are performed with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with Ta=25°C. The SOA curve provides a single pulse rating.

Complementary MOSFET

ELM14614AA-N

■ Typical Electrical and Thermal Characteristics (P-ch)

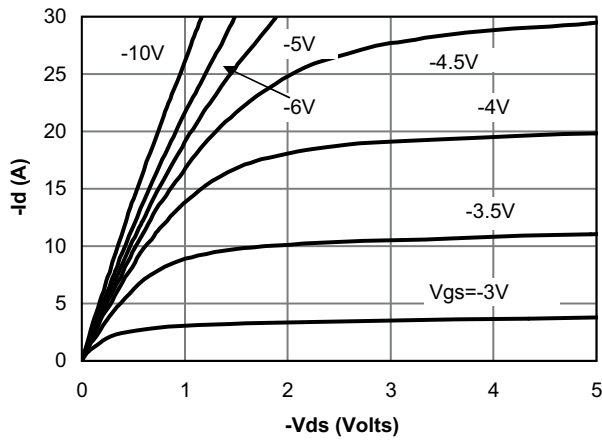


Fig 1: On-Region Characteristics

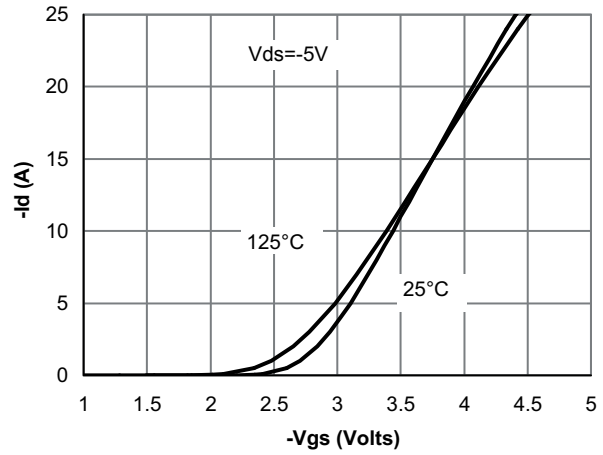


Figure 2: Transfer Characteristics

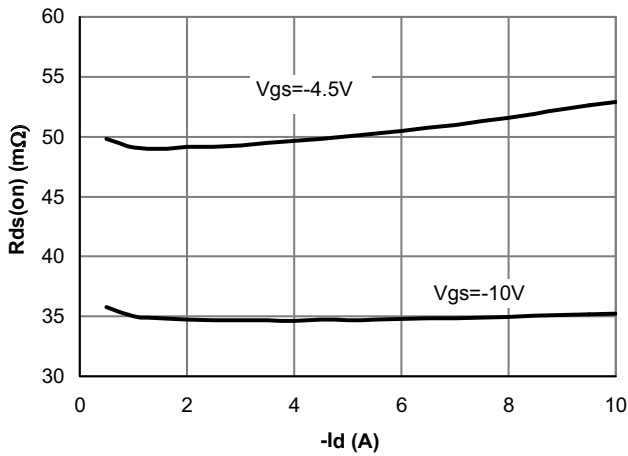


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

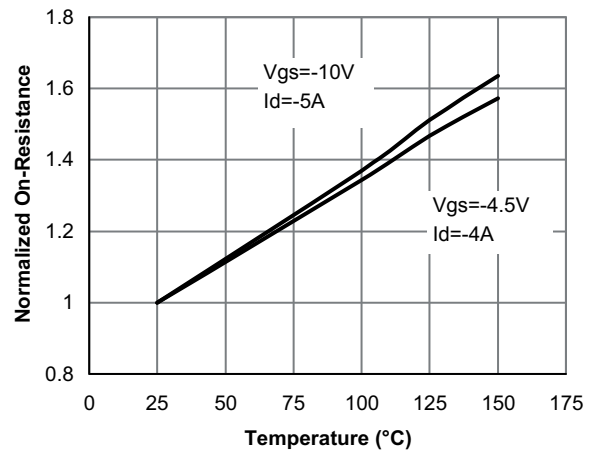


Figure 4: On-Resistance vs. Junction Temperature

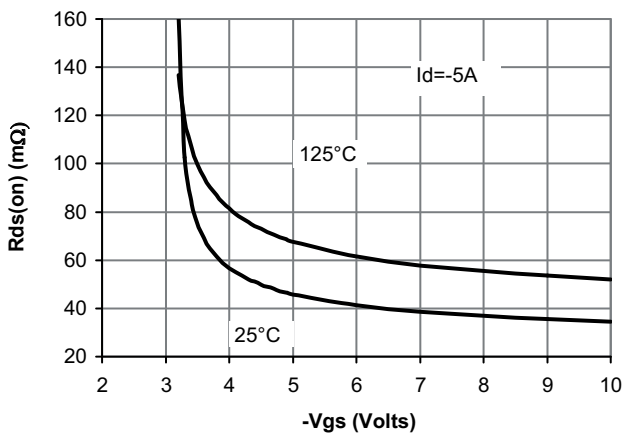


Figure 5: On-Resistance vs. Gate-Source Voltage

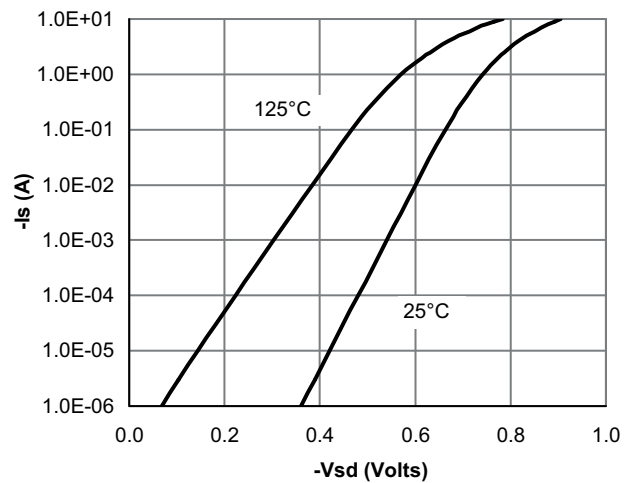


Figure 6: Body-Diode Characteristics

Complementary MOSFET

ELM14614AA-N

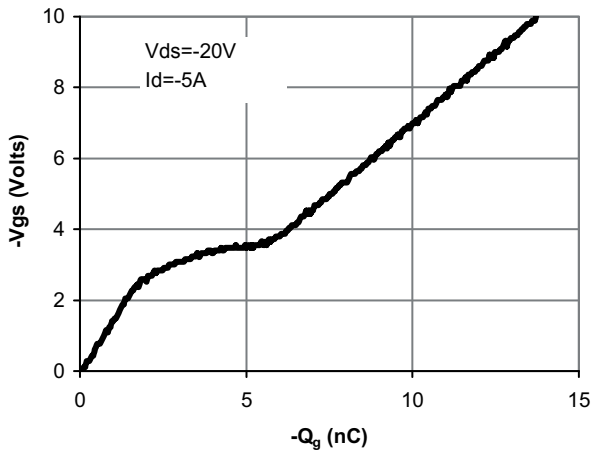


Figure 7: Gate-Charge Characteristics

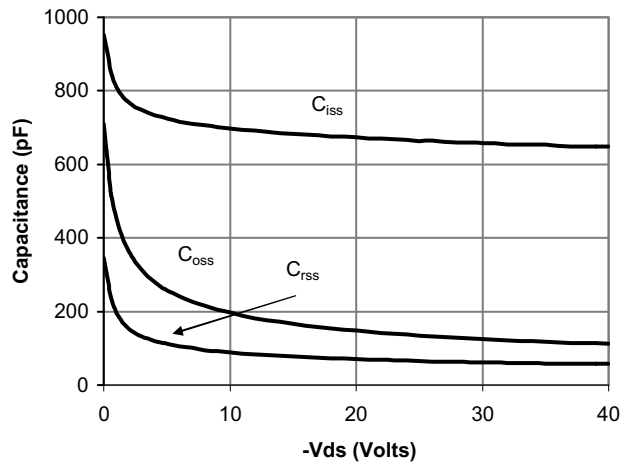


Figure 8: Capacitance Characteristics

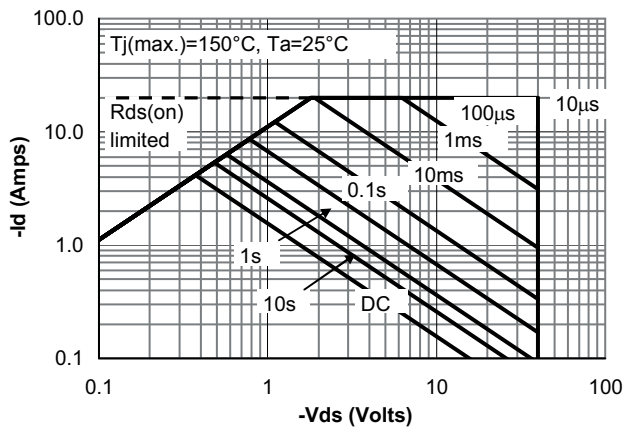


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

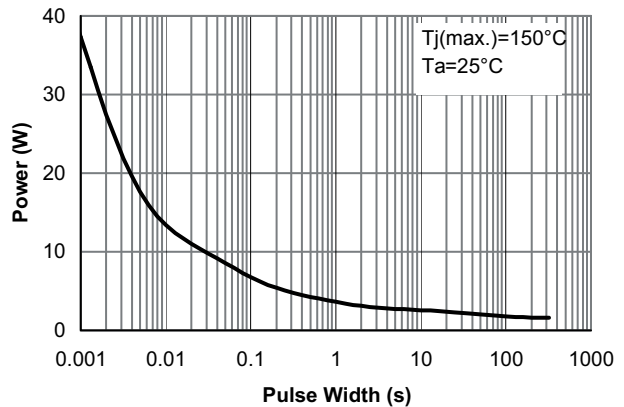


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

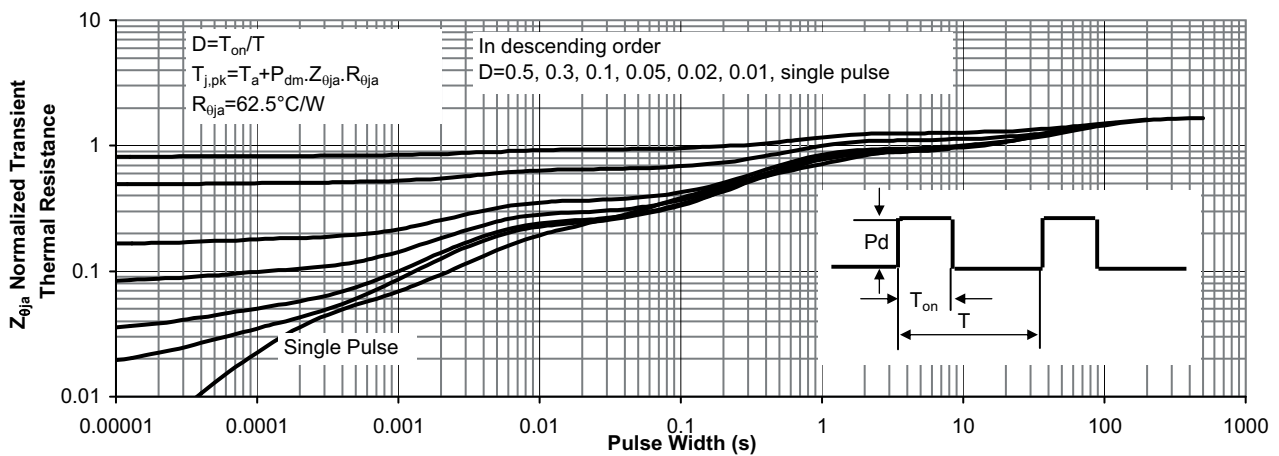


Figure 11: Normalized Maximum Transient Thermal Impedance