

Complementary MOSFET

ELM34601AA-N

General Description

ELM34601AA-N uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

Features

- | | |
|--|---|
| N-channel | P-channel |
| • $V_{ds}=30V$ | $V_{ds}=-30V$ |
| • $I_d=7A$ | $I_d=-6A$ |
| • $R_{ds(on)} < 21m\Omega (V_{gs}=10V)$ | $R_{ds(on)} < 35m\Omega (V_{gs}=-10V)$ |
| • $R_{ds(on)} < 32m\Omega (V_{gs}=4.5V)$ | $R_{ds(on)} < 60m\Omega (V_{gs}=-4.5V)$ |

Maximum Absolute Ratings

Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note
Drain-source voltage	V_{ds}	30	-30	V	
Gate-source voltage	V_{gs}	± 20	± 20	V	
Continuous drain current	I_d	$T_a=25^\circ C$	7	-6	A
		$T_a=70^\circ C$	6	-5	
Pulsed drain current	I_{dm}	28	-24	A	1
Power dissipation	P_d	$T_a=25^\circ C$	2.0	2.0	W
		$T_a=70^\circ C$	1.3	1.3	
Junction and storage temperature range	T_j, T_{stg}	-55 to 150	-55 to 150	$^\circ C$	

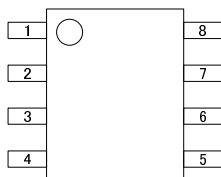
Thermal Characteristics

Parameter	Symbol	Device	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$R\theta_{ja}$	N-ch		62.5	$^\circ C/W$	
Maximum junction-to-ambient	$R\theta_{ja}$	P-ch		62.5	$^\circ C/W$	

1. Pulse width limited by maximum junction temperature.
2. Duty cycle $\leq 1\%$.

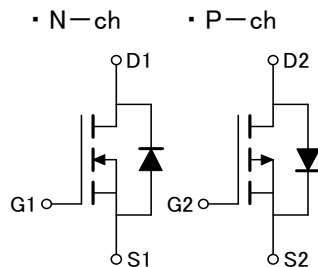
Pin Configuration

SOP-8 (TOP VIEW)



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

Circuit



Complementary MOSFET

ELM34601AA-N

Electrical Characteristics (N-ch)

T_a=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	I _d =250 μA, V _{gs} =0V	30			V	
Zero gate voltage drain current	I _{dss}	V _{ds} =24V, V _{gs} =0V			1	μA	
		V _{ds} =20V, V _{gs} =0V, T _j =55°C			10		
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 =250 μA	0.8	1.5	2.5	V	
On state drain current	I _{d(on)}	V _{gs} =10V, V _{ds} =5V	28			A	1
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =7A		14	21	mΩ	1
		V _{gs} =4.5V, I _d =6A		21	32		
Forward transconductance	G _{fs}	V _{ds} =10V, I _d =5A		8		S	1
Diode forward voltage	V _{sd}	I _f =1A, V _{gs} =0V			1	V	1
Max.body-diode continuous current	I _s				3	A	
Pulsed current	I _{sm}				6	A	3
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =10V, f=1MHz		1700		pF	
Output capacitance	C _{oss}				380		pF
Reverse transfer capacitance	C _{rss}				260		pF
SWITCHING PARAMETERS							
Total gate charge	Q _g	V _{gs} =10V, V _{ds} =15V, I _d =6A		40		nC	2
Gate-source charge	Q _{gs}			28		nC	2
Gate-drain charge	Q _{gd}			12		nC	2
Turn-on delay time	t _{d(on)}	V _{gs} =10V, V _{ds} =15V, I _d ≈ 1A R _{gen} =6 Ω		20		ns	2
Turn-on rise time	t _r			10		ns	2
Turn-off delay time	t _{d(off)}			120		ns	2
Turn-off fall time	t _f			35		ns	2
Body-diode reverse recovery time	t _{rr}		I _f =5A, dI/dt=100A/μs		15.5		ns
Body-diode reverse recovery charge	Q _{rr}			7.9		nC	

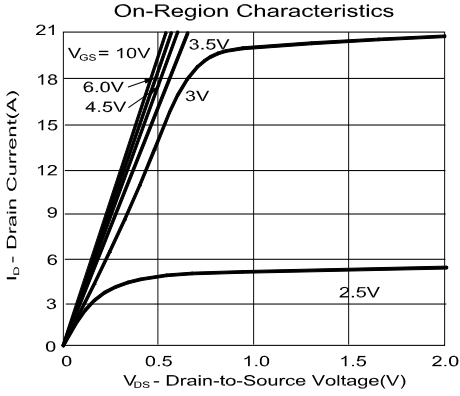
NOTE :

1. Pulse test : Pulse width ≤ 300 μsec, duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulse width limited by maximum junction temperature.

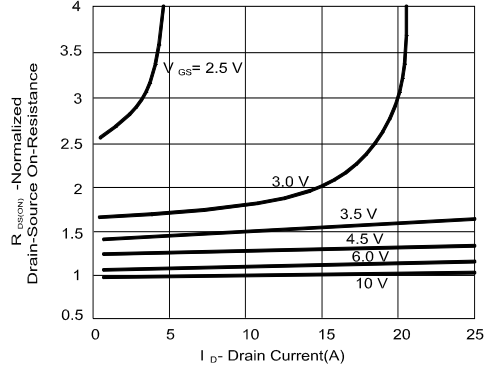
Complementary MOSFET

ELM34601AA-N

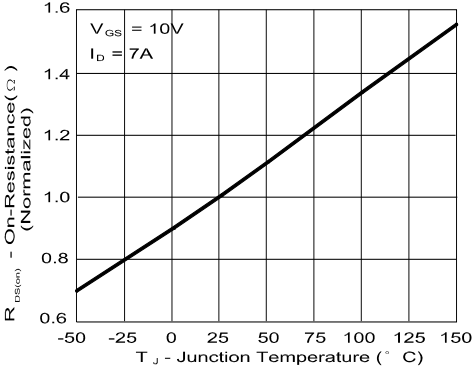
Typical Electrical and Thermal Characteristics (N-ch)



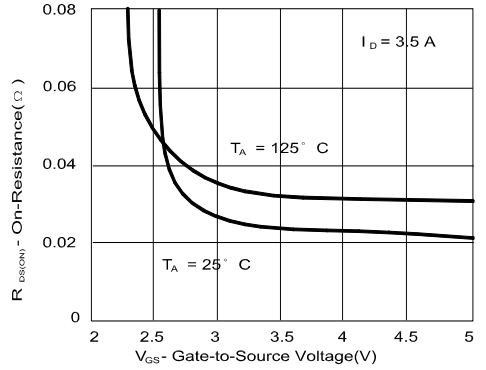
On-Resistance Variation with Drain Current and Gate Voltage



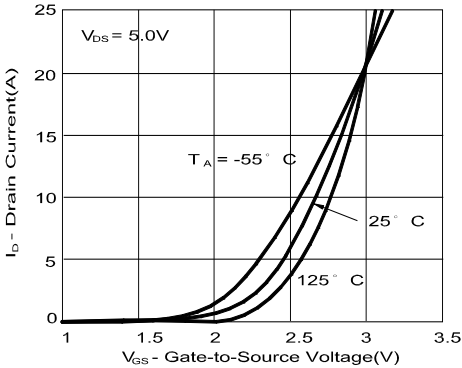
On-Resistance Variation with Temperature



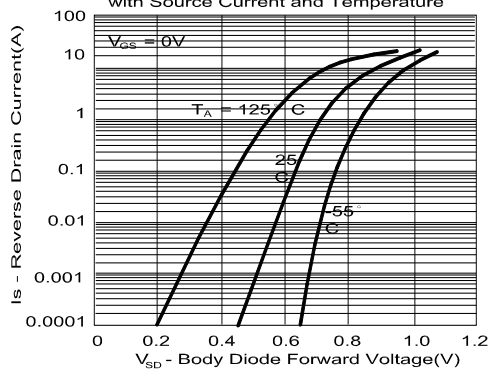
On-Resistance Variation with Gate-to-Source Voltage



Transfer Characteristics



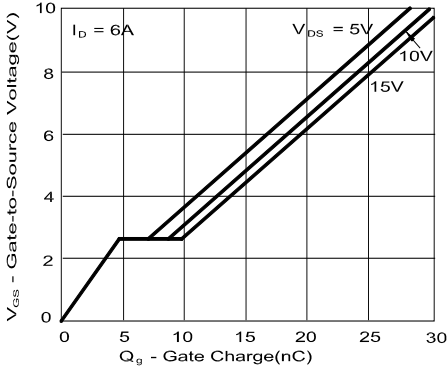
Body Diode Forward Voltage Variation with Source Current and Temperature



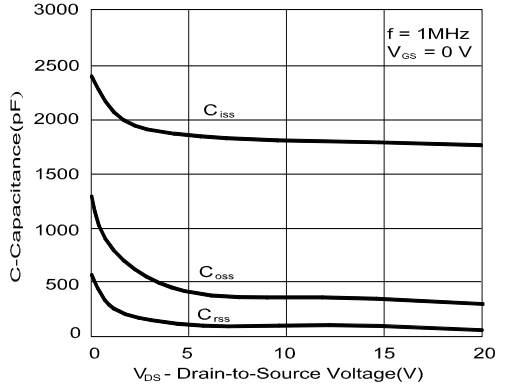
Complementary MOSFET

ELM34601AA-N

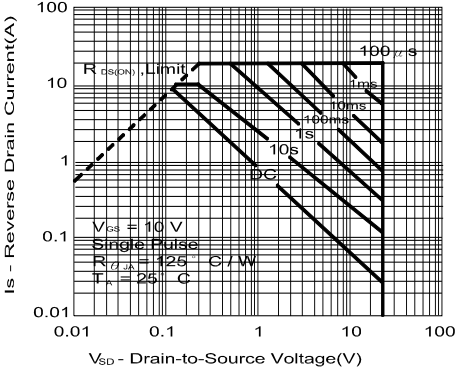
Gate Charge Characteristics



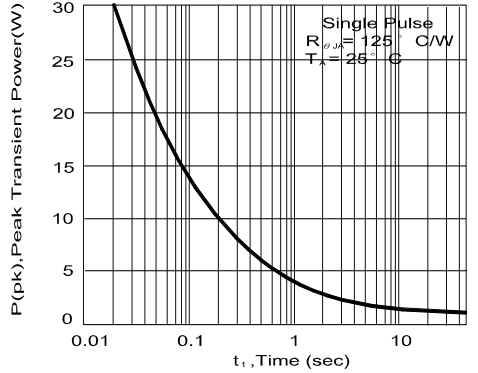
Capacitance Characteristics



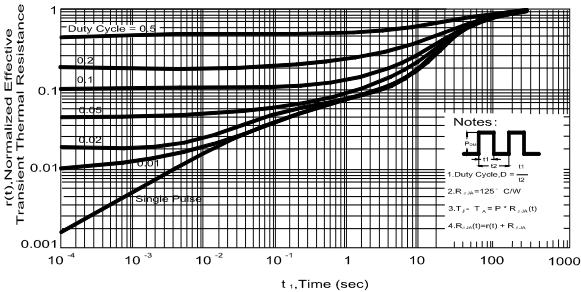
Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve



Complementary MOSFET

ELM34601AA-N

Electrical Characteristics (P-ch)

T_a=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	I _d =-250μA, V _{gs} =0V	-30			V	
Zero gate voltage drain current	I _{dss}	V _{ds} =-24V, V _{gs} =0V			-1	μA	
		V _{ds} =-20V, V _{gs} =0V, T _j =55°C			-10		
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	-0.8	-1.5	-2.5	V	
On state drain current	I _{d(on)}	V _{gs} =-10V, V _{ds} =-5V	-24			A	1
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =-10V, I _d =-6A		28	35	mΩ	1
		V _{gs} =-4.5V, I _d =-5A		44	60		
Forward transconductance	G _{fs}	V _{ds} =-10V, I _d =-5A		7		S	1
Diode forward voltage	V _{sd}	I _f =-1A, V _{gs} =0V			-1	V	1
Max.body-diode continuous current	I _s				-3	A	
Pulsed current	I _{sm}				-6	A	3
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =-10V, f=1MHz		970		pF	
Output capacitance	C _{oss}			370		pF	
Reverse transfer capacitance	C _{rss}			180		pF	
SWITCHING PARAMETERS							
Total gate charge	Q _g	V _{gs} =-10V, V _{ds} =-15V I _d =-5A		28		nC	2
Gate-source charge	Q _{gs}			6		nC	2
Gate-drain charge	Q _{gd}			12		nC	2
Turn-on delay time	t _{d(on)}	V _{gs} =-10V, V _{ds} =-15V I _d ≈-1A, R _l =1Ω, R _{gen} =6Ω		20		ns	2
Turn-on rise time	t _r			17		ns	2
Turn-off delay time	t _{d(off)}			160		ns	2
Turn-off fall time	t _f			75		ns	2
Body-diode reverse recovery time	t _{rr}		I _f =-5A, dI/dt=100A/μs		15.5		ns
Body-diode reverse recovery charge	Q _{rr}			7.9		nC	

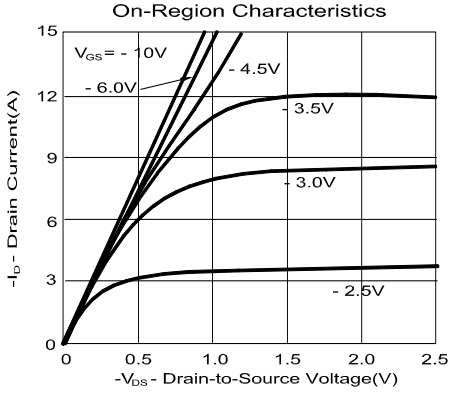
NOTE :

1. Pulse test : Pulse width ≤ 300μsec, duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulse width limited by maximum junction temperature.

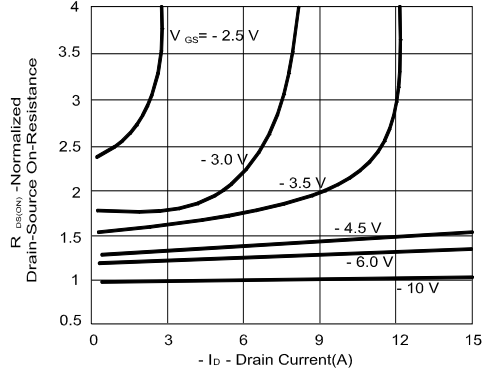
Complementary MOSFET

ELM34601AA-N

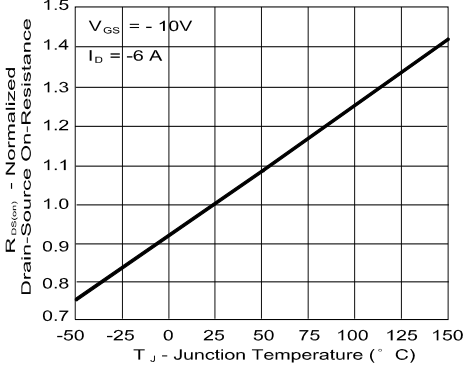
Typical Electrical and Thermal Characteristics (P-ch)



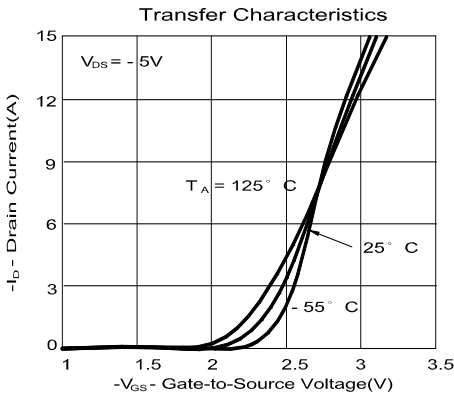
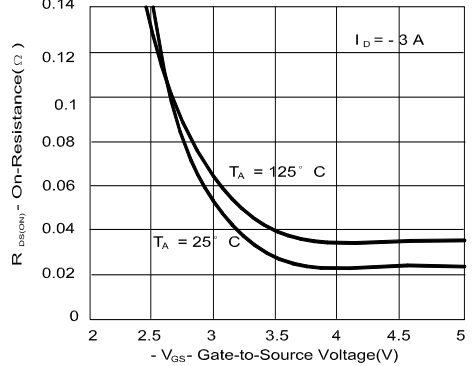
On-Resistance Variation with Drain Current and Gate Voltage



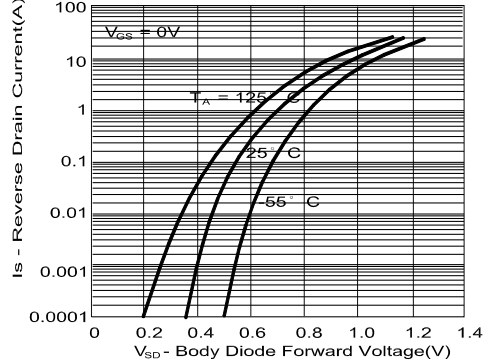
On-Resistance Variation with Temperature



On-Resistance Variation with Gate-to-Source Voltage



Body Diode Forward Voltage Variation with Source Current and Temperature



Complementary MOSFET

ELM34601AA-N

