

# Complementary MOSFET

## ELM35601KA-S

### ■ General Description

ELM35601KA-S uses advanced trench technology to provide excellent  $R_{ds(on)}$  and low gate charge.

### ■ Features

- |   |  |
|---|--|
| N-channel                               | P-channel                              |
| • $V_{ds}=40V$                          | $V_{ds}=-40V$                          |
| • $I_d=7A$                              | $I_d=-5.5A$                            |
| • $R_{ds(on)} < 28m\Omega (V_{gs}=10V)$ | $R_{ds(on)} < 48m\Omega (V_{gs}=-10V)$ |
| • $R_{ds(on)} < 49m\Omega (V_{gs}=5V)$  | $R_{ds(on)} < 85m\Omega (V_{gs}=-5V)$  |

### ■ Maximum Absolute Ratings

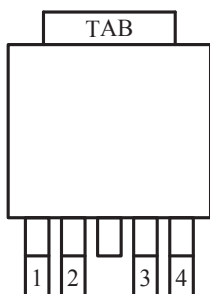
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note
Drain-source voltage	$V_{ds}$	40	-40	V	
Gate-source voltage	$V_{gs}$	$\pm 20$	$\pm 20$	V	
Continuous drain current	$I_d$	$T_a=25^\circ C$	7.0	-5.5	A
		$T_a=70^\circ C$	6.0	-4.5	
Pulsed drain current	$I_{dm}$	50	-50	A	3
Power dissipation	$P_d$	$T_a=25^\circ C$	3.0	3.0	W
		$T_a=70^\circ C$	2.1	2.1	
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		42	$^\circ C/W$	
Maximum junction-to-case	$R_{\theta jc}$	N-ch		6	$^\circ C/W$	
Maximum junction-to-ambient	$R_{\theta ja}$	P-ch		42	$^\circ C/W$	
Maximum junction-to-case	$R_{\theta jc}$	P-ch		6	$^\circ C/W$	

### ■ Pin configuration

TO-252-4(TOP VIEW)

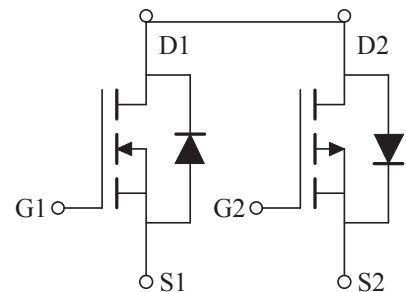


Pin No.	Pin name
1	SOURCE1
2	GATE1
3	SOURCE2
4	GATE2
TAB	DRAIN1/DRAIN2

### ■ Circuit

• N-ch

• P-ch



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### ■Electrical Characteristics (N-ch)

Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
<b>STATIC PARAMETERS</b>							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	40			V	
Zero gate voltage drain current	Idss	Vds=32V, Vgs=0V			1	μA	
		Vds=30V, Vgs=0V, Tj=55°C			10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	1.2	2.0	3.0	V	
On state drain current	Id(on)	Vgs=10V, Vds=5V	50			A	1
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=7A		24	28	mΩ	1
		Vgs=5V, Id=6A		38	49		
Forward transconductance	Gfs	Vds=10V, Id=7A		19		S	1
Diode forward voltage	Vsd	If=7A, Vgs=0V			1.2	V	1
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	Ciss	Vgs=0V, Vds=10V, f=1MHz		530	662	pF	
Output capacitance	Coss			118	165	pF	
Reverse transfer capacitance	Crss			44	66	pF	
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Qg	Vgs=10V, Vds=20V, Id=7A		12.8		nC	2
Gate-source charge	Qgs			2.0		nC	2
Gate-drain charge	Qgd			1.7		nC	2
Turn-on delay time	td(on)	Vgs=10V, Vds=20V, Id≈1A Rgen=6Ω		1.8	3.5	ns	2
Turn-on rise time	tr			6.0	12.0	ns	2
Turn-off delay time	td(off)			8.2	15.1	ns	2
Turn-off fall time	tf			3.0	5.9	ns	2
Body diode reverse recovery time	trr	If=8A, dl/dt=100A/μs		42		ns	
Body diode reverse recovery charge	Qrr			30		nC	

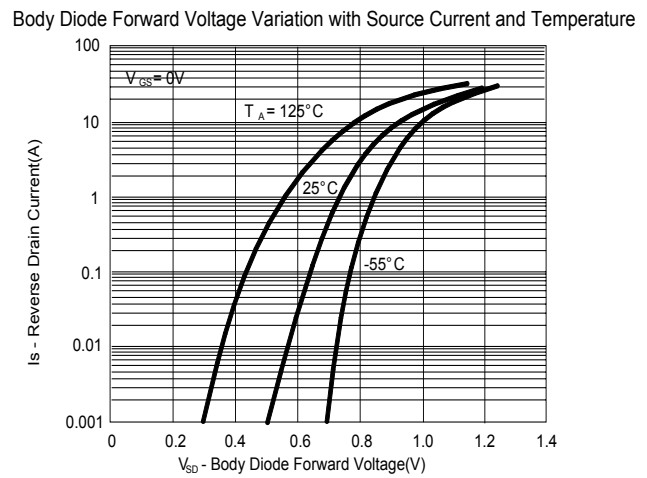
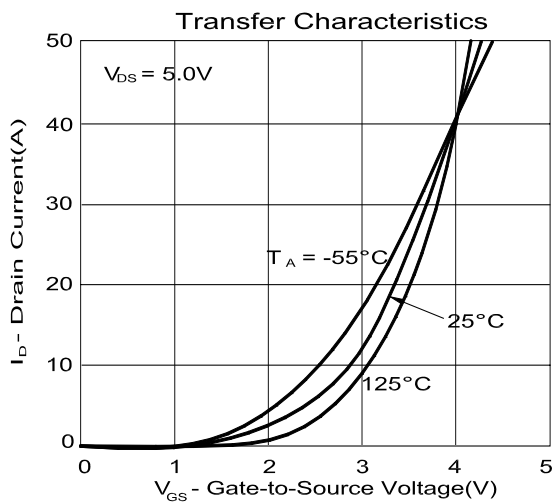
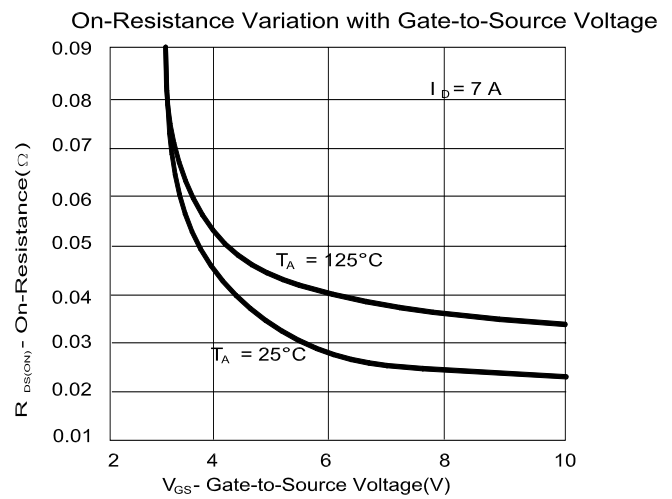
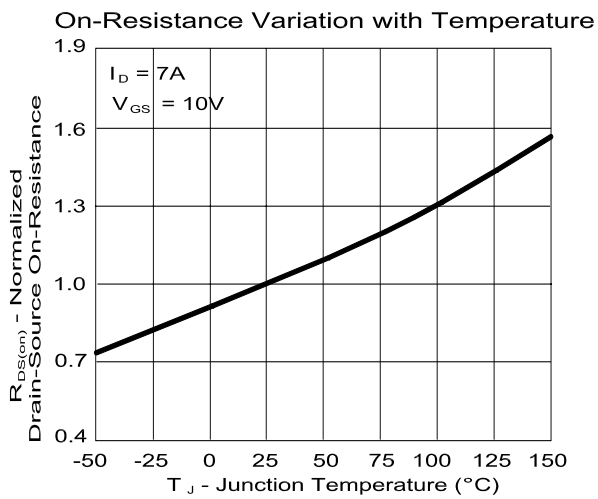
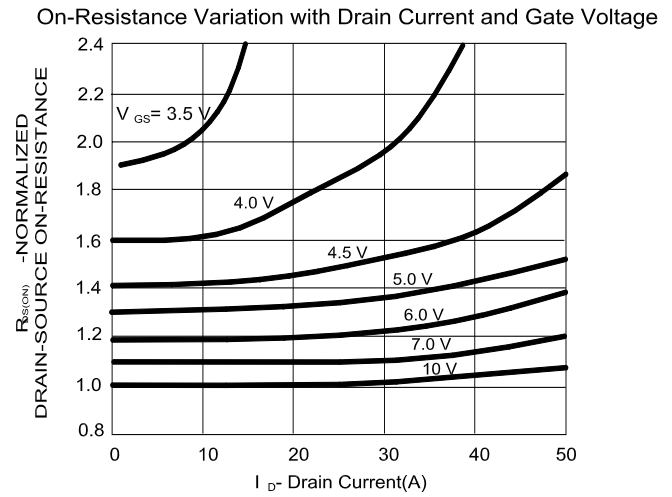
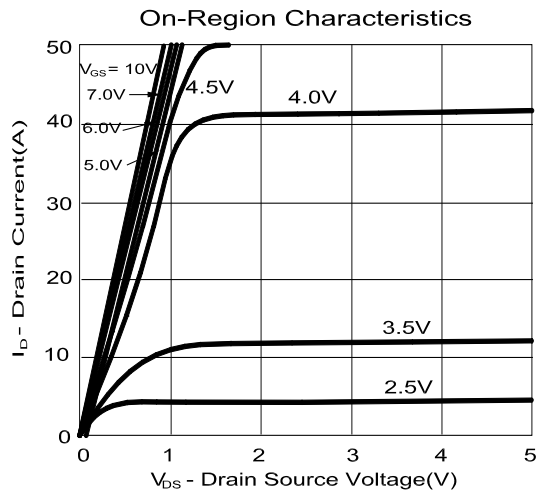
#### NOTE :

1. Pulse test : Pulsed width≤300μsec and Duty cycle≤2%.
2. Independent of operating temperature.
3. Pulsed width limited by maximum junction temperature.
4. Duty cycle ≤ 1%.

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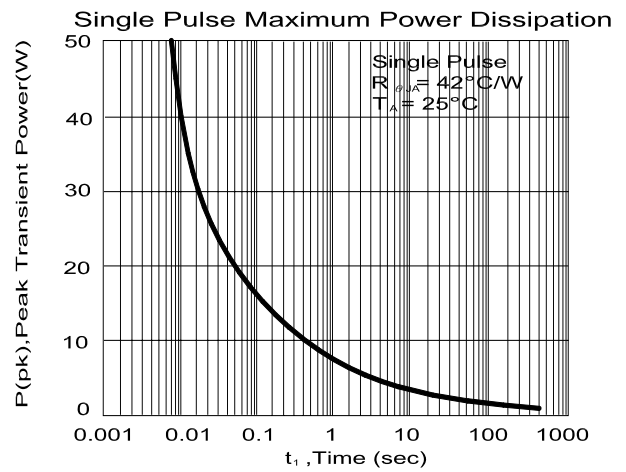
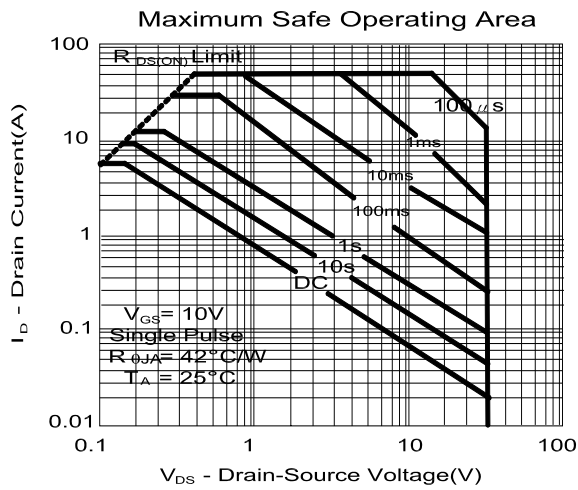
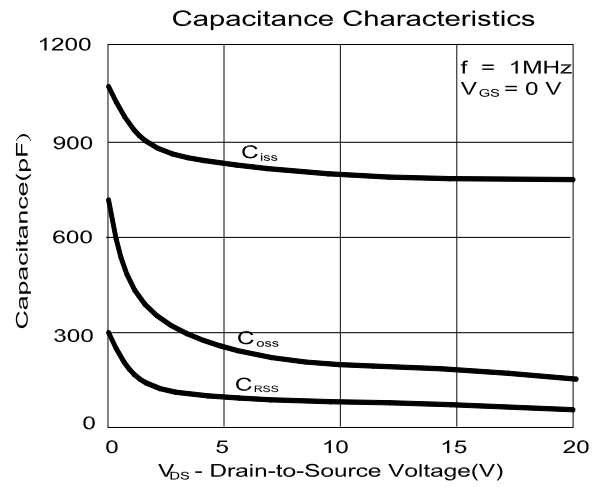
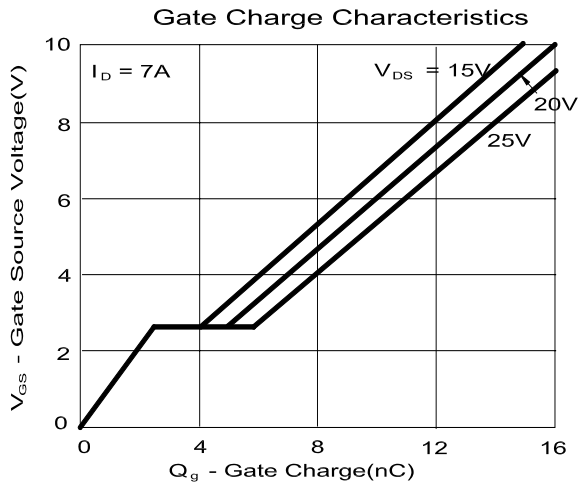
## ELM35601KA-S

### ■ Typical Electrical and Thermal Characteristics (N-ch)



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# Complementary MOSFET

## ELM35601KA-S

### ■Electrical Characteristics (P-ch)

Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
<b>STATIC PARAMETERS</b>							
Drain-source breakdown voltage	BVdss	Id=-250μA, Vgs=0V	-40			V	
Zero gate voltage drain current	Idss	Vds=-32V, Vgs=0V			-1	μA	
		Vds=-30V, Vgs=0V, Tj=55°C			-10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA	-1.2	-2.0	-3.0	V	
On state drain current	Id(on)	Vgs=-10V, Vds=-5V	-50			A	1
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-5.5A		37	48	mΩ	1
		Vgs=-5V, Id=-4.5A		56	85		
Forward transconductance	Gfs	Vds=-10V, Id=-5.5A		11		S	1
Diode forward voltage	Vsd	If=-5.5A, Vgs=0V			-1.2	V	1
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	Ciss			690	863	pF	
Output capacitance	Coss	Vgs=0V, Vds=-10V, f=1MHz		310	430	pF	
Reverse transfer capacitance	Crss			75	113	pF	
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Qg	Vgs=-10V, Vds=-20V Id=-5.5A		14.0		nC	2
Gate-source charge	Qgs			2.2		nC	2
Gate-drain charge	Qgd			1.9		nC	2
Turn-on delay time	td(on)	Vgs=-10V, Vds=-20V Id≈-1A, Rgen=6Ω		6.7	13.4	ns	2
Turn-on rise time	tr			9.7	19.4	ns	2
Turn-off delay time	td(off)			19.8	35.6	ns	2
Turn-off fall time	tf			12.3	22.2	ns	2
Body diode reverse recovery time	trr	If=-7A, dl/dt=100A/μs		55		ns	
Body diode reverse recovery charge	Qrr			52		nC	

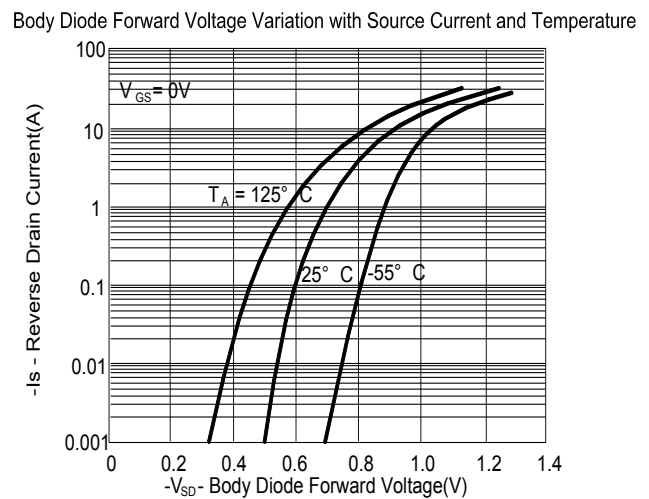
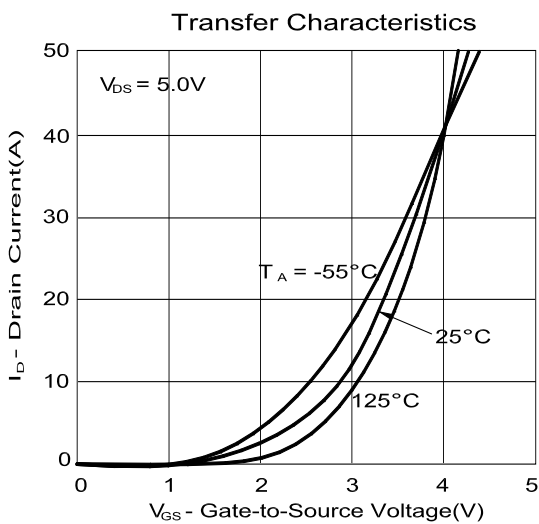
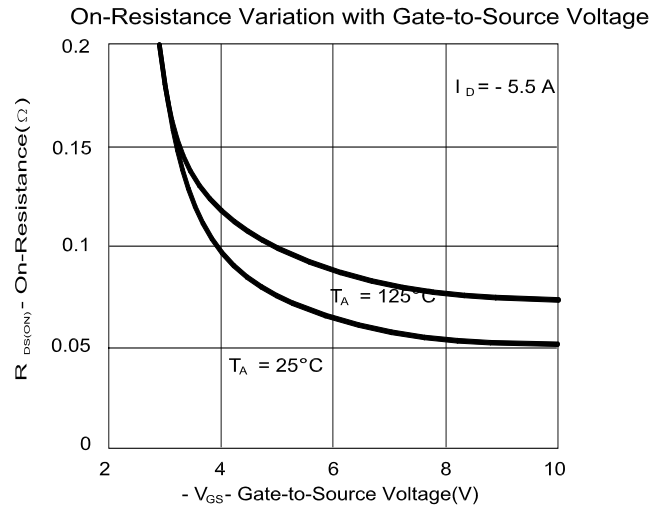
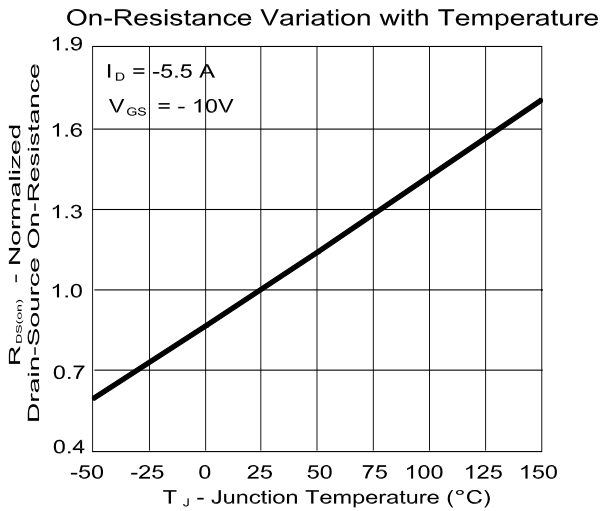
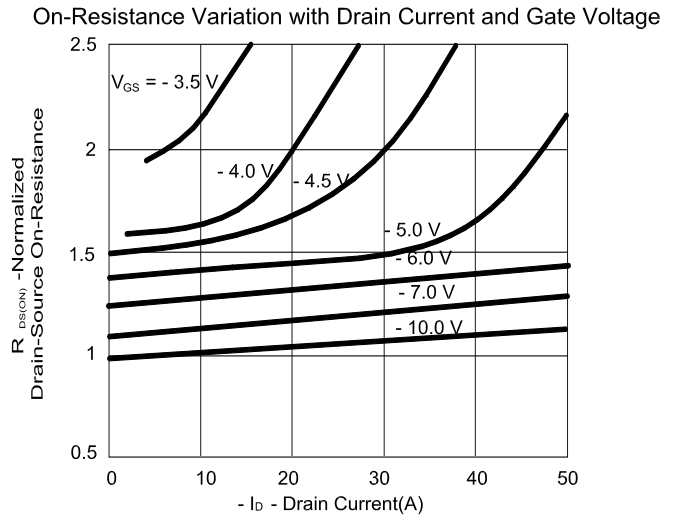
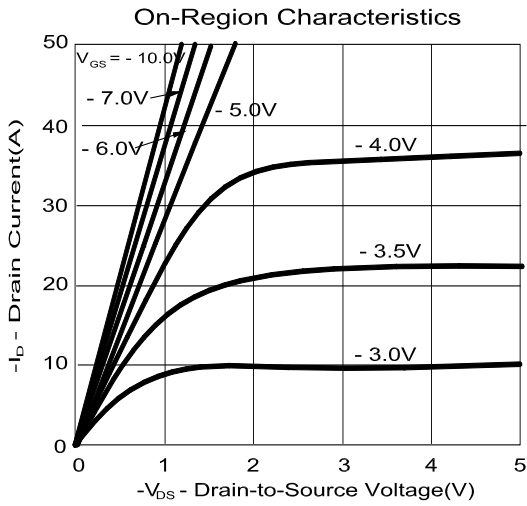
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