

# Complementary MOSFET

## ELM35604KA-S

### ■ General Description

ELM35604KA-S uses advanced trench technology to provide excellent  $R_{ds(on)}$  and low gate charge.

### ■ Features

- |  |   |
|--|---|
| N-channel                                | P-channel                               |
| • $V_{ds}=30V$                           | $V_{ds}=-30V$                           |
| • $I_d=8.5A$                             | $I_d=-7A$                               |
| • $R_{ds(on)} < 21m\Omega (V_{gs}=10V)$  | $R_{ds(on)} < 35m\Omega (V_{gs}=-10V)$  |
| • $R_{ds(on)} < 32m\Omega (V_{gs}=4.5V)$ | $R_{ds(on)} < 60m\Omega (V_{gs}=-4.5V)$ |

### ■ Maximum Absolute Ratings

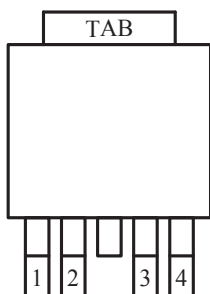
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note
Drain-source voltage	$V_{ds}$	30	-30	V	
Gate-source voltage	$V_{gs}$	$\pm 20$	$\pm 20$	V	
Continuous drain current	$I_d$	$T_a=25^\circ C$	8.5	-7.0	A
		$T_a=70^\circ C$	7.0	-5.8	
Pulsed drain current	$I_{dm}$	50	-50	A	3
Power dissipation	$P_d$	$T_a=25^\circ C$	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)

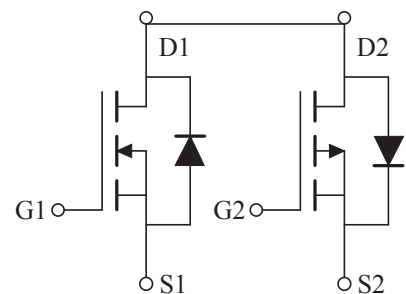


Pin No.	Pin name
1	SOURCE1
2	GATE1
3	SOURCE2
4	GATE2
TAB	DRAIN1/DRAIN2

### ■ 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	30			V	
Zero gate voltage drain current	Idss	Vds=24V, Vgs=0V			1	μA	
		Vds=20V, 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	0.8	1.5	2.5	V	
On state drain current	Id(on)	Vgs=10V, Vds=5V	50			A	1
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=8A		17.5	21.0	mΩ	1
		Vgs=4.5V, Id=6A		24.0	32.0		
Forward transconductance	Gfs	Vds=10V, Id=8A		13		S	1
Diode forward voltage	Vsd	If=3A, Vgs=0V			1.2	V	1
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	Ciss	Vgs=0V, Vds=10V, f=1MHz		1200		pF	
Output capacitance	Coss			180		pF	
Reverse transfer capacitance	Crss			160		pF	
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Qg	Vgs=10V, Vds=15V, Id=8A		16		nC	2
Gate-source charge	Qgs			6		nC	2
Gate-drain charge	Qgd			8		nC	2
Turn-on delay time	td(on)	Vgs=10V, Vds=15V, Id≈1A Rgen=3.3Ω		20		ns	2
Turn-on rise time	tr			10		ns	2
Turn-off delay time	td(off)			30		ns	2
Turn-off fall time	tf			65		ns	2
Body diode reverse recovery time	trr	If=8A, dl/dt=100A/μs		42		ns	
Body diode reverse recovery charge	Qrr			30		nC	

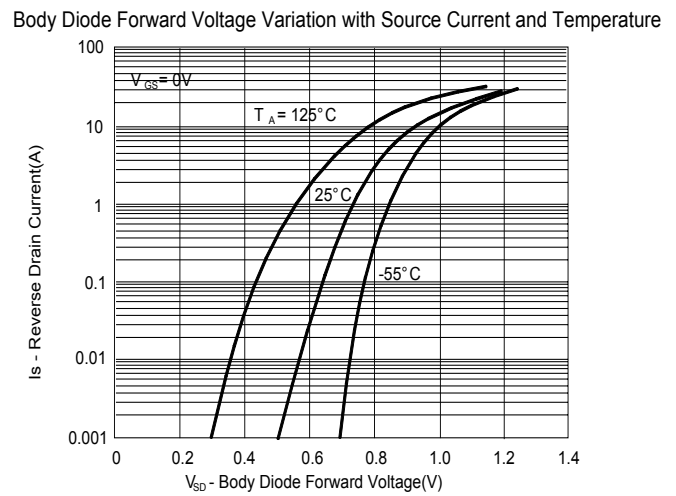
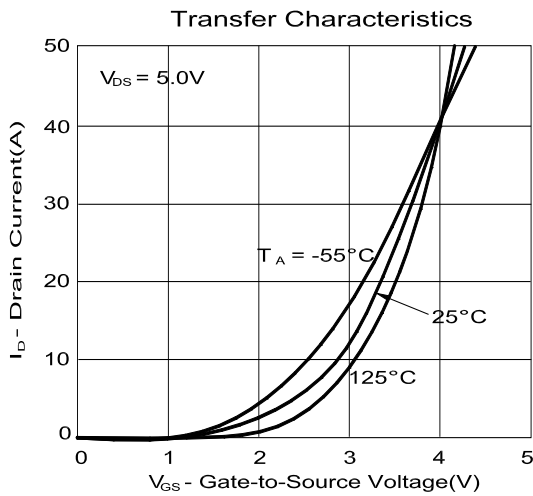
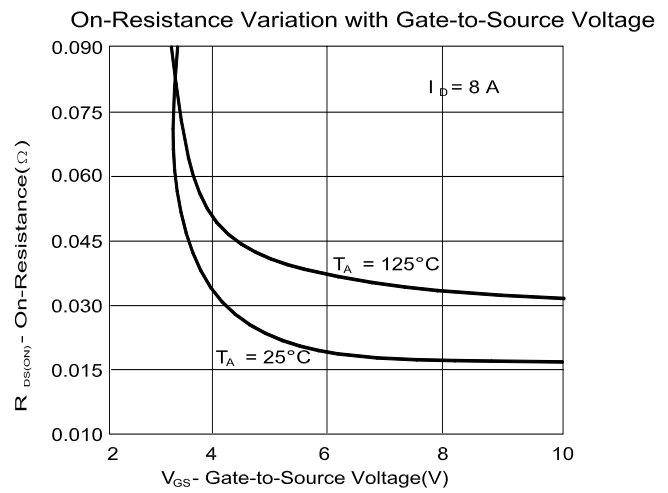
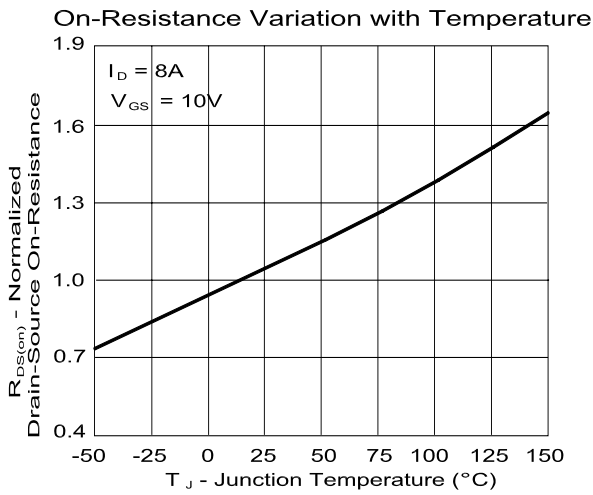
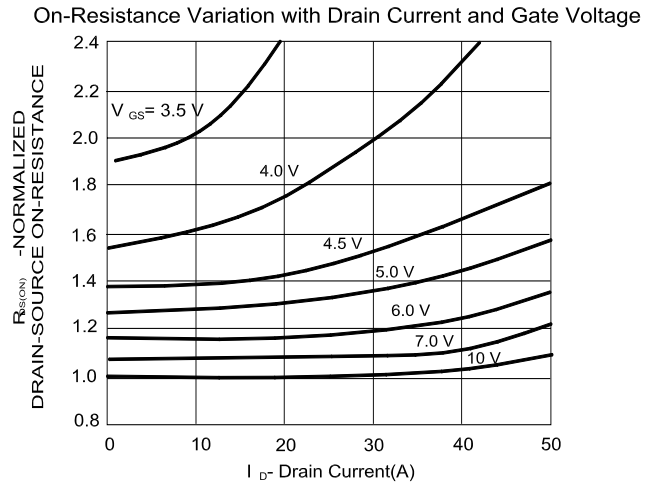
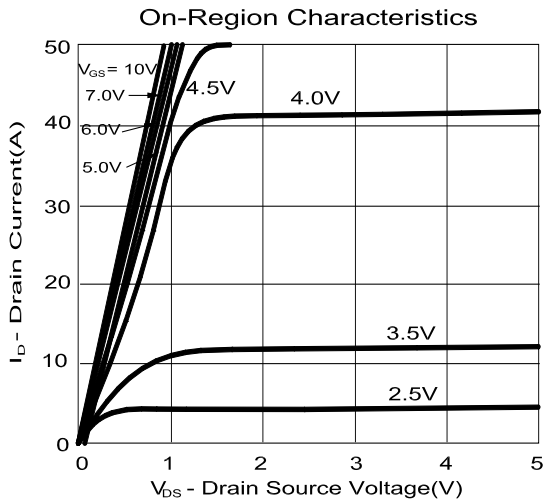
#### NOTE :

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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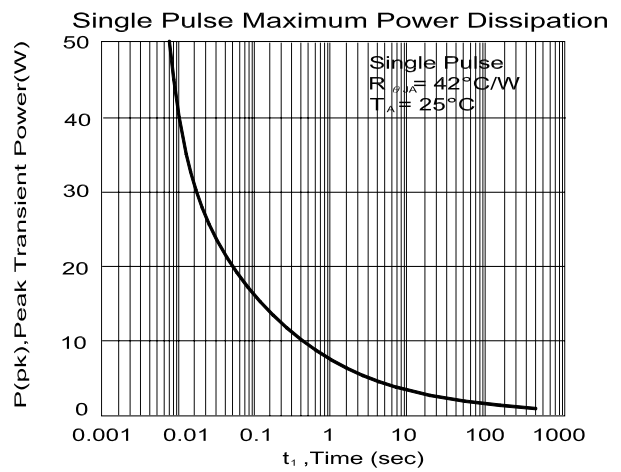
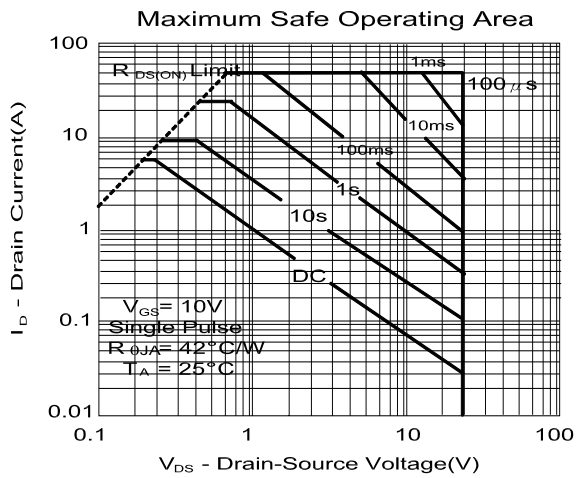
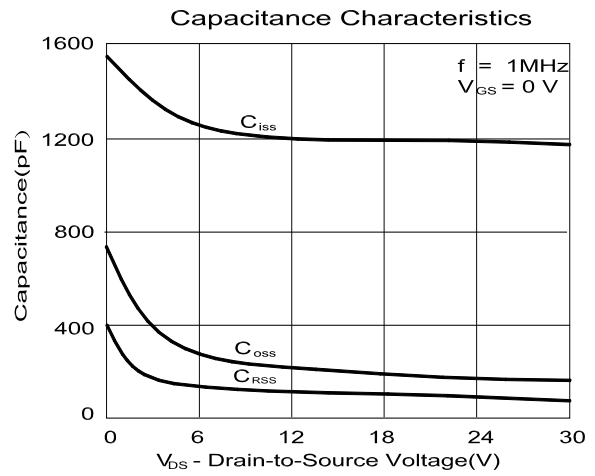
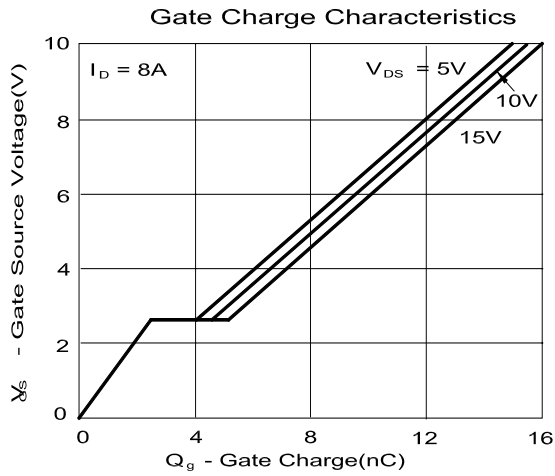
## ELM35604KA-S

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



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### ■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	-30			V	
Zero gate voltage drain current	Idss	Vds=-24V, Vgs=0V			-1	μA	
		Vds=-20V, 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	-0.8	-1.5	-2.5	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		28	35	mΩ	1
		Vgs=-4.5V, Id=-5A		46	60		
Forward transconductance	Gfs	Vds=-10V, Id=-7A		10		S	1
Diode forward voltage	Vsd	If=-3A, Vgs=0V			-1.2	V	1
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	Ciss			970		pF	
Output capacitance	Coss	Vgs=0V, Vds=-10V, f=1MHz		270		pF	
Reverse transfer capacitance	Crss			180		pF	
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Qg	Vgs=-10V, Vds=-15V Id=-7A		13		nC	2
Gate-source charge	Qgs			4		nC	2
Gate-drain charge	Qgd			6		nC	2
Turn-on delay time	td(on)	Vgs=-10V, Vds=-15V Id≈-1A, Rgen=3.3Ω		22		ns	2
Turn-on rise time	tr			12		ns	2
Turn-off delay time	td(off)			32		ns	2
Turn-off fall time	tf			75		ns	2
Body diode reverse recovery time	trr	If=-7A, dl/dt=100A/μs		55		ns	
Body diode reverse recovery charge	Qrr			52		nC	

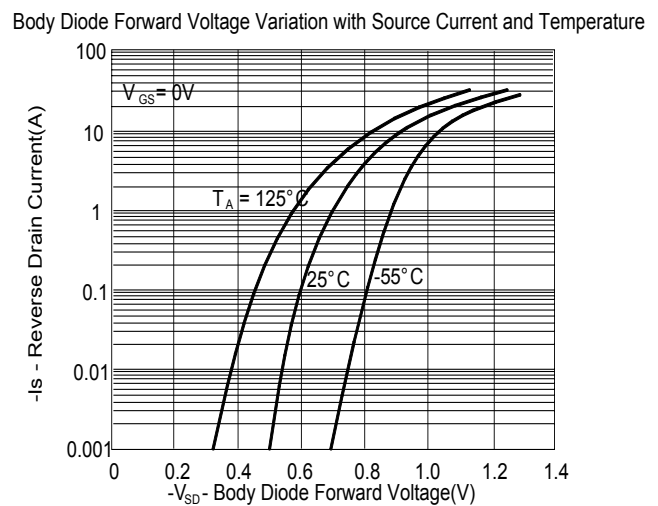
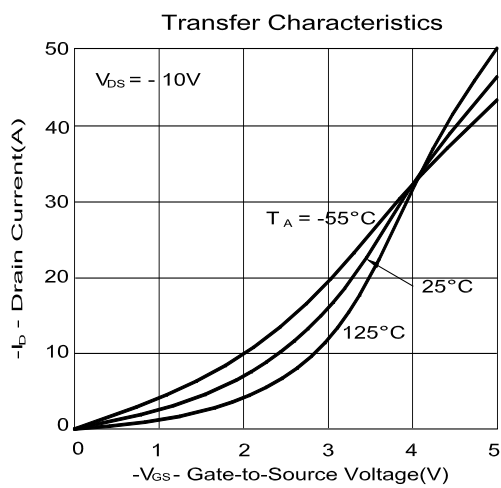
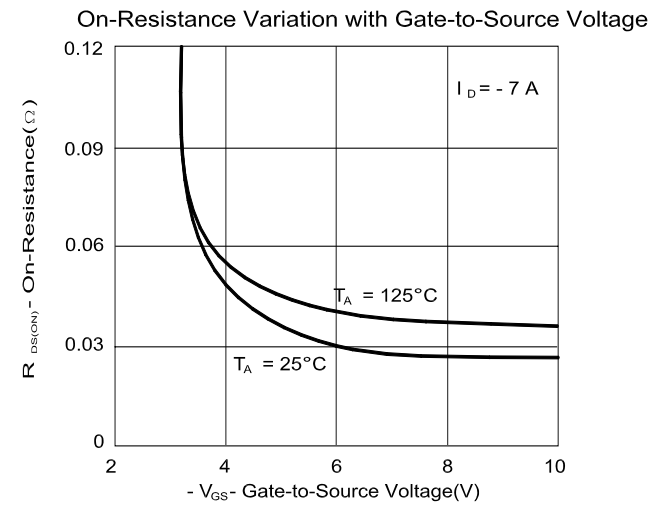
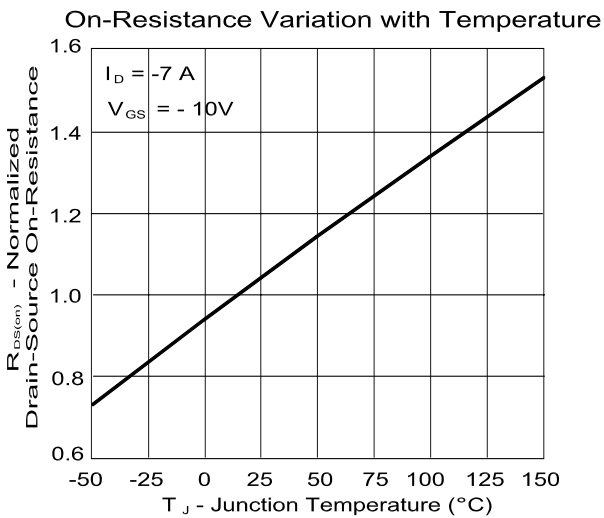
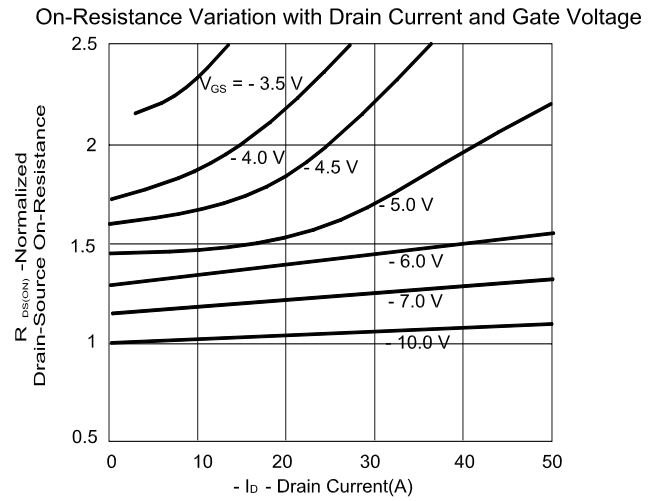
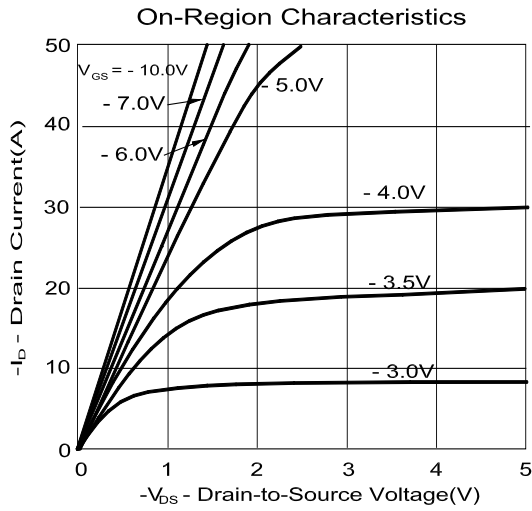
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