

Complementary MOSFET

ELM35603KA-S

■ General Description

ELM35603KA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

■ Features

- | | |
|---|--|
| N-channel | P-channel |
| • $V_{ds}=40V$ | $V_{ds}=-40V$ |
| • $I_d=10A$ | $I_d=-7A$ |
| • $R_{ds(on)} < 22m\Omega (V_{gs}=10V)$ | $R_{ds(on)} < 33m\Omega (V_{gs}=-10V)$ |
| • $R_{ds(on)} < 33m\Omega (V_{gs}=7V)$ | $R_{ds(on)} < 40m\Omega (V_{gs}=-7V)$ |

■ Maximum Absolute Ratings

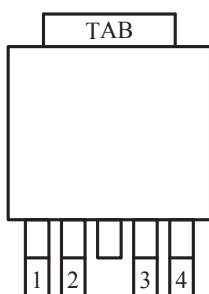
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note
Drain-source voltage	V_{ds}	40	-40	V	
Gate-source voltage	V_{gs}	± 20	± 20	V	
Continuous drain current	I_d	$T_a=25^\circ C$	10.0	-7.0	A
		$T_a=70^\circ C$	8.5	-6.0	
Pulsed drain current	I_{dm}	50	-50	A	3
Power dissipation	P_d	$T_a=25^\circ C$	3.0	3.0	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	$^\circ C/W$	

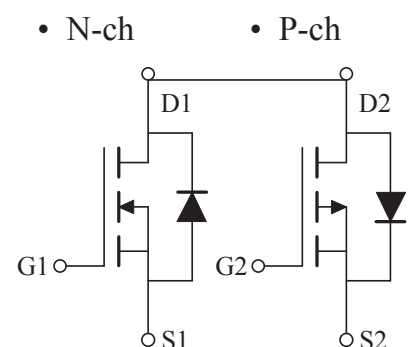
■ Pin configuration

TO-252-4(TOP VIEW)



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

■ Circuit



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■Electrical Characteristics (N-ch)

Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
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=10A		19	22	mΩ	1
		Vgs=7V, Id=7A		25	33		
Forward transconductance	Gfs	Vds=10V, Id=10A		25		S	1
Diode forward voltage	Vsd	If=10A, Vgs=0V			1.2	V	1
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=10V, f=1MHz		1145	1450	pF	
Output capacitance	Coss			253	355	pF	
Reverse transfer capacitance	Crss			94	142	pF	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=10V, Vds=20V, Id=10A		23.0		nC	2
Gate-source charge	Qgs			3.6		nC	2
Gate-drain charge	Qgd			3.0		nC	2
Turn-on delay time	td(on)	Vgs=10V, Vds=20V, Id≈1A Rgen=6Ω		3.2	6.4	ns	2
Turn-on rise time	tr			10.8	21.7	ns	2
Turn-off delay time	td(off)			17.1	30.8	ns	2
Turn-off fall time	tf			5.3	10.7	ns	2
Body diode reverse recovery time	trr	If=10A, dl/dt=100A/μs		60		ns	
Body diode reverse recovery charge	Qrr			43		nC	

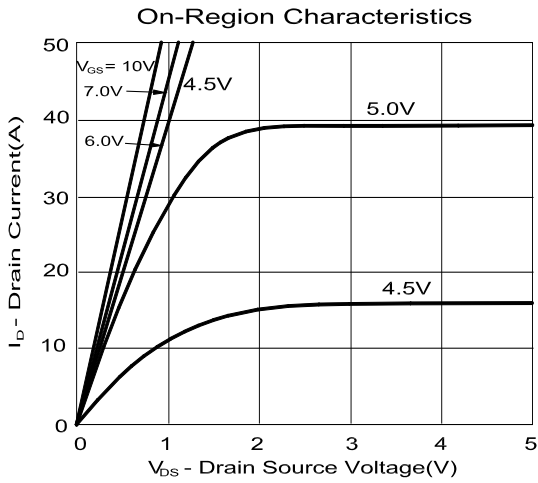
NOTE :

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%.

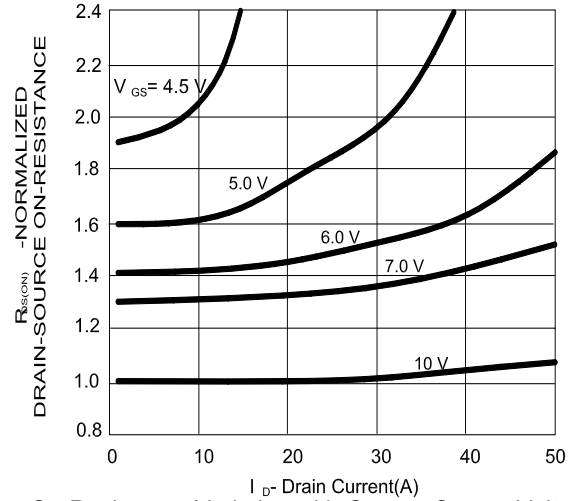
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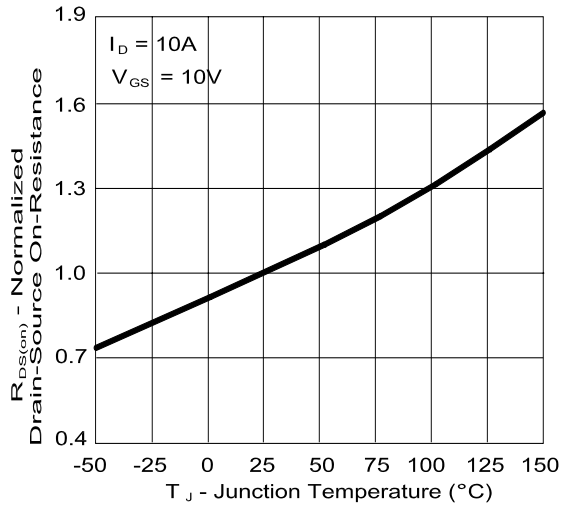
■ Typical Electrical and Thermal Characteristics (N-ch)



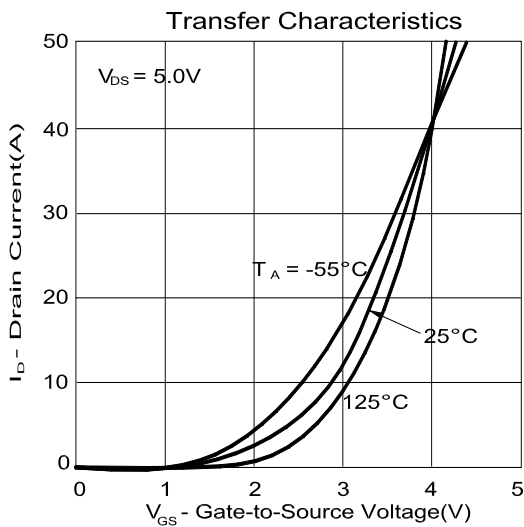
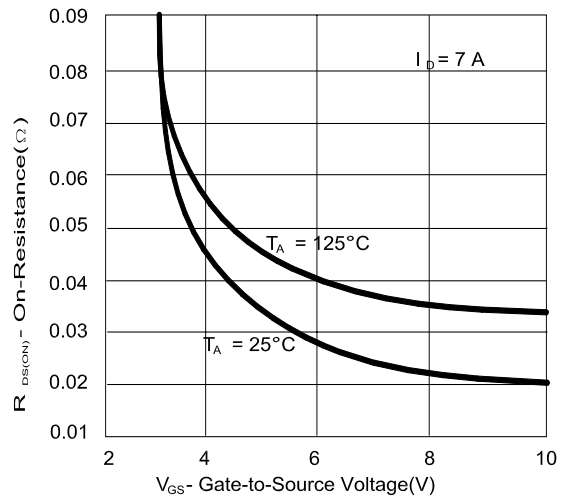
On-Resistance Variation with Drain Current and Gate Voltage



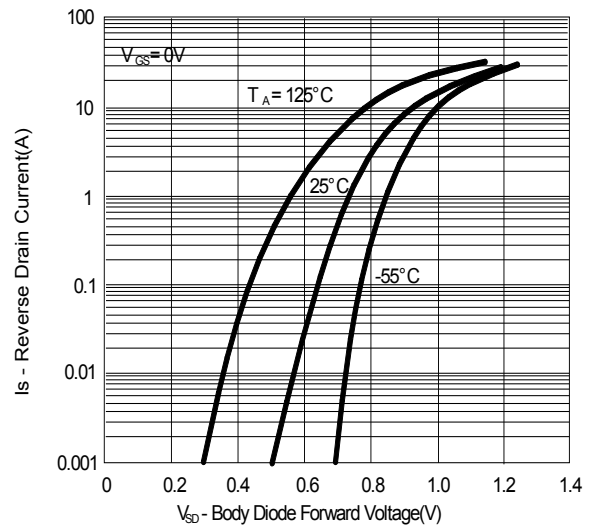
On-Resistance Variation with Temperature



On-Resistance Variation with Gate-to-Source Voltage

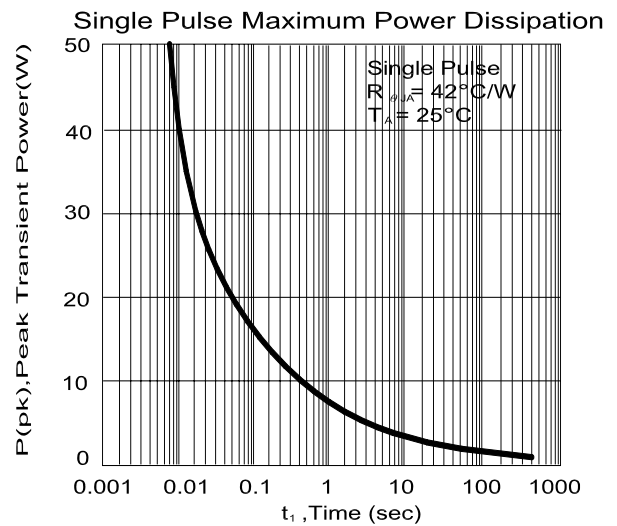
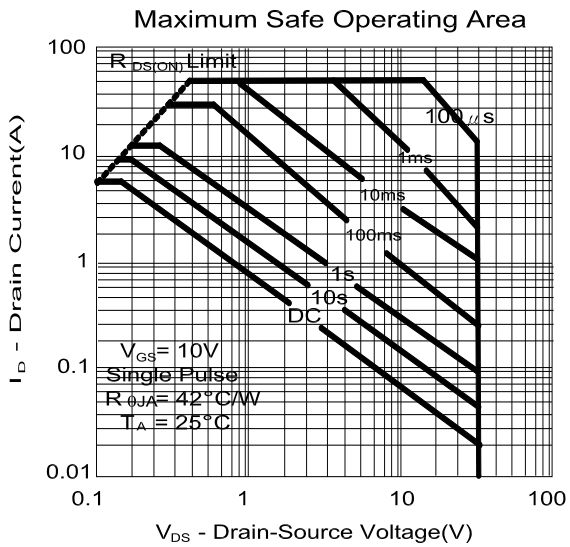
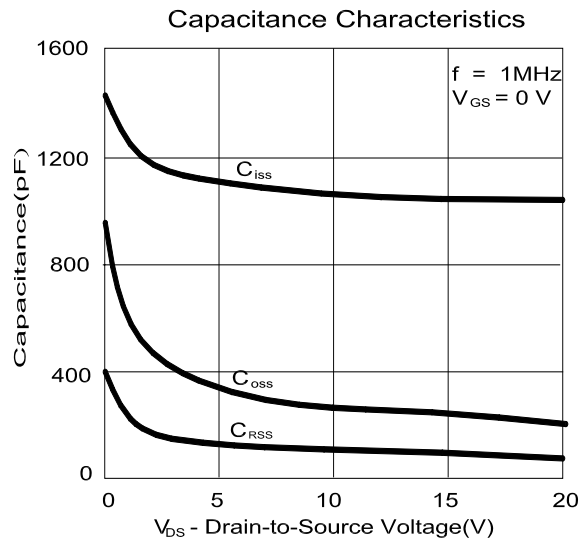
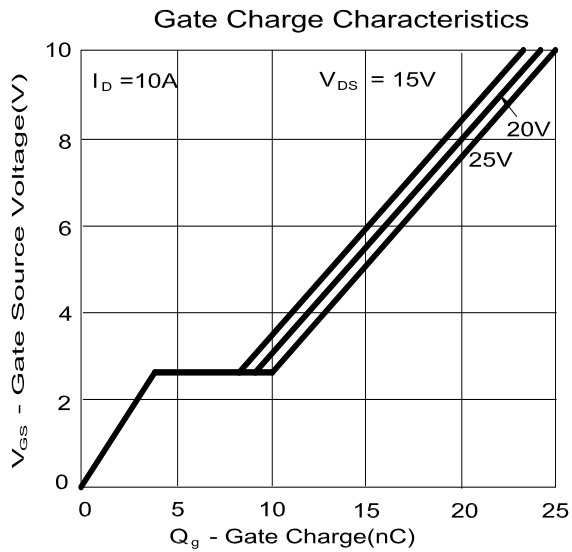


Body Diode Forward Voltage Variation with Source Current and Temperature



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■Electrical Characteristics (P-ch)

Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
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		28	33	mΩ	1
		Vgs=-7V, Id=-5A		32	40		
Forward transconductance	Gfs	Vds=-10V, Id=-7A		18		S	1
Diode forward voltage	Vsd	If=-7A, Vgs=0V			-1.2	V	1
DYNAMIC PARAMETERS							
Input capacitance	Ciss			1000	1260	pF	
Output capacitance	Coss	Vgs=0V, Vds=-10V, f=1MHz		450	625	pF	
Reverse transfer capacitance	Crss			108	163	pF	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=-10V, Vds=-20V Id=-7A		20.0		nC	2
Gate-source charge	Qgs			3.2		nC	2
Gate-drain charge	Qgd			2.7		nC	2
Turn-on delay time	td(on)	Vgs=-10V, Vds=-20V Id≈-1A, Rgen=6Ω		9.7	19.4	ns	2
Turn-on rise time	tr			14.0	28.1	ns	2
Turn-off delay time	td(off)			28.7	51.6	ns	2
Turn-off fall time	tf			17.8	32.2	ns	2
Body diode reverse recovery time	trr	If=-7A, dl/dt=100A/μs		80		ns	
Body diode reverse recovery charge	Qrr			75		nC	

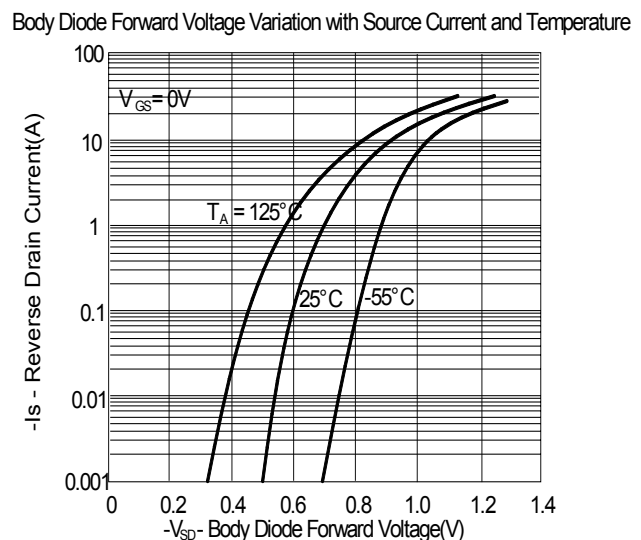
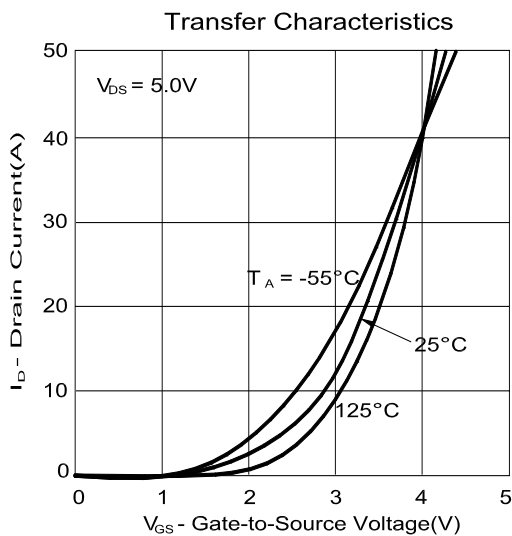
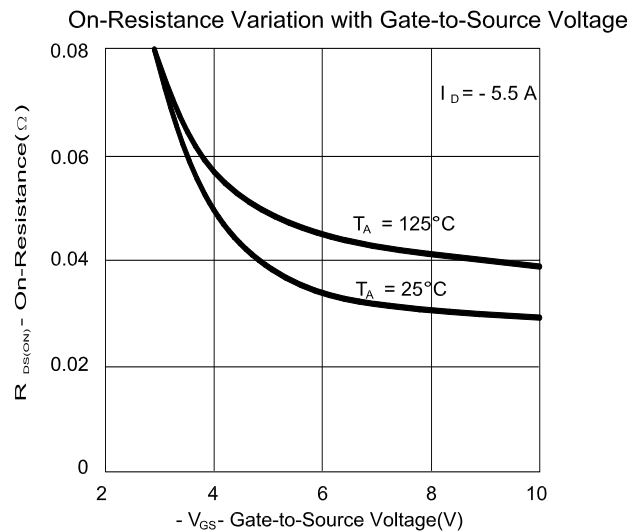
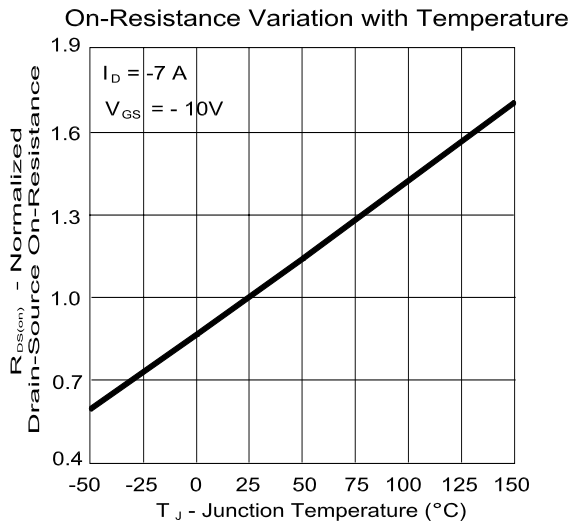
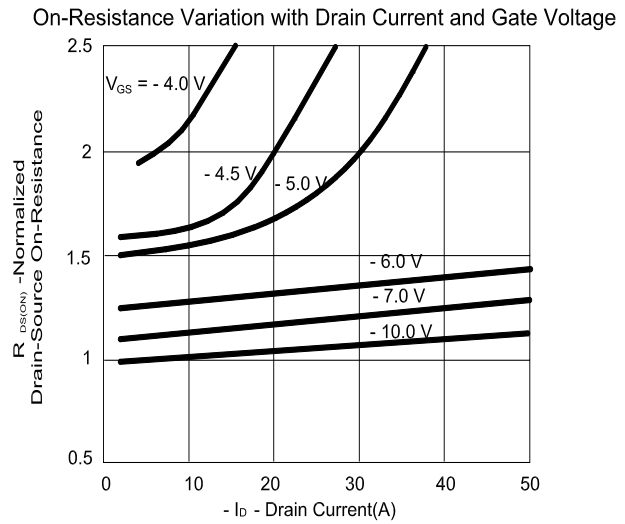
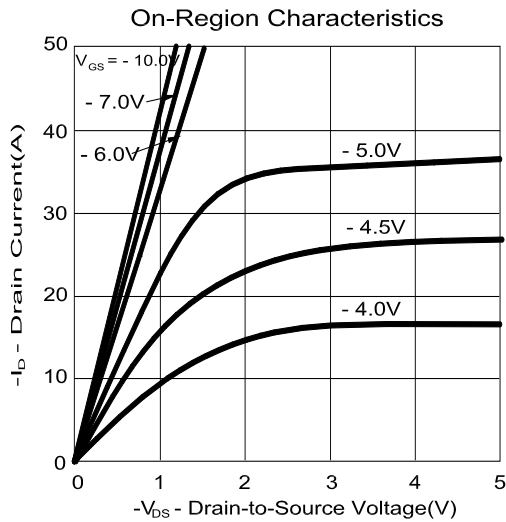
NOTE :

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