

Complementary MOSFET

ELM35602KA-S

General Description

ELM35602KA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

Features

- | | |
|--|---|
| N-channel | P-channel |
| • $V_{ds}=30V$ | $V_{ds}=-30V$ |
| • $I_d=8A$ | $I_d=-6A$ |
| • $R_{ds(on)} < 25m\Omega$ ($V_{gs}=10V$) | $R_{ds(on)} < 45m\Omega$ ($V_{gs}=-10V$) |
| • $R_{ds(on)} < 37m\Omega$ ($V_{gs}=4.5V$) | $R_{ds(on)} < 80m\Omega$ ($V_{gs}=-4.5V$) |

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	$T_a=25^{\circ}C$	I_d	8.0	-6.0	A	
	$T_a=70^{\circ}C$		6.5	-4.8		
Pulsed drain current		I_{dm}	50	-50	A	1
Power dissipation	$T_a=25^{\circ}C$	P_d	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	$^{\circ}C$	

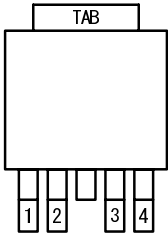
Thermal Characteristics

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	$^{\circ}C/W$	

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

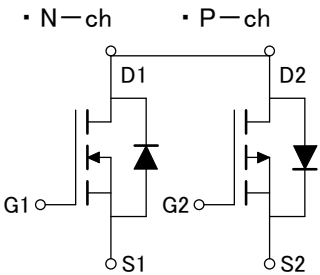
Pin Configuration

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)

T_a=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	I _d =250 μ A, V _{gs} =0V	30			V	
Zero gate voltage drain current	I _{dss}	V _{ds} =24V, V _{gs} =0V			1	μ A	
		V _{ds} =20V, V _{gs} =0V, T _j =55°C			10		
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} = $\pm$ 20V			$\pm$ 100	nA	
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250 μ A	1.0	1.5	2.5	V	
On state drain current	I _{d(on)}	V _{gs} =10V, V _{ds} =5V	50			A	1
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =8A		18	25	m Ω	1
		V _{gs} =4.5V, I _d =7A		25	37		
Forward transconductance	G _{fs}	V _{ds} =10V, I _d =8A		19		S	1
Diode forward voltage	V _{sd}	I _f =3A, V _{gs} =0V			1.3	V	1
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =10V, f=1MHz		790		pF	
Output capacitance	C _{oss}			175		pF	
Reverse transfer capacitance	C _{rss}			65		pF	
SWITCHING PARAMETERS							
Total gate charge	Q _g	V _{gs} =10V, V _{ds} =15V, I _d =8A		16.0		nC	2
Gate-source charge	Q _{gs}			2.5		nC	2
Gate-drain charge	Q _{gd}			2.1		nC	2
Turn-on delay time	t _{d(on)}	V _{gs} =10V, V _{ds} =10V, I _d $\approx$ 1A R _{gen} =6 Ω		2.2	4.4	ns	2
Turn-on rise time	t _r			7.5	15.0	ns	2
Turn-off delay time	t _{d(off)}			11.8	21.3	ns	2
Turn-off fall time	t _f			3.7	7.4	ns	2
Body diode reverse recovery time	t _{rr}	I _f =8A, dI/dt=100A/ μ s		42		ns	
Body diode reverse recovery charge	Q _{rr}			30		nC	

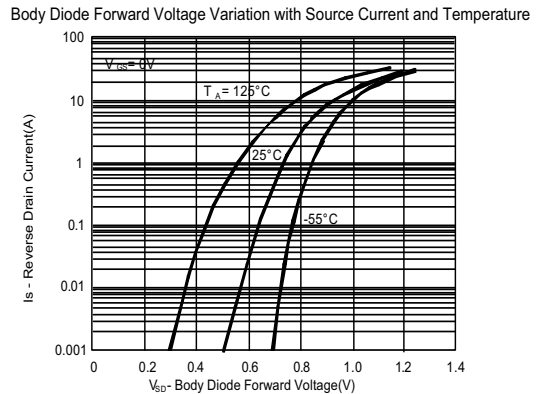
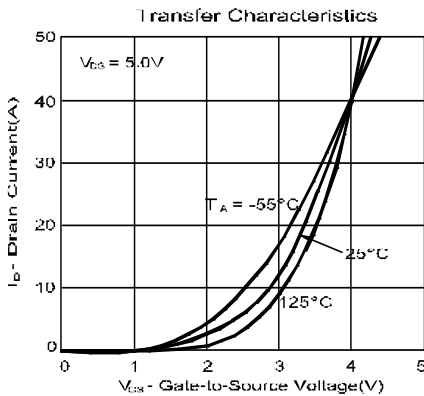
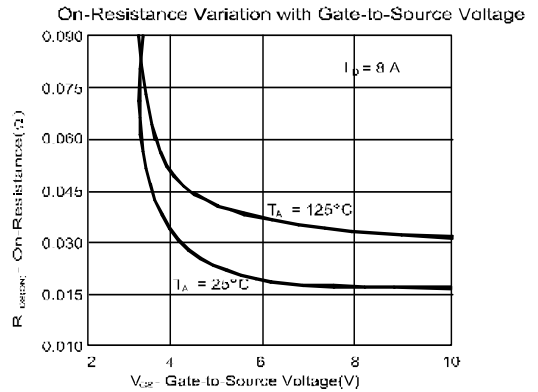
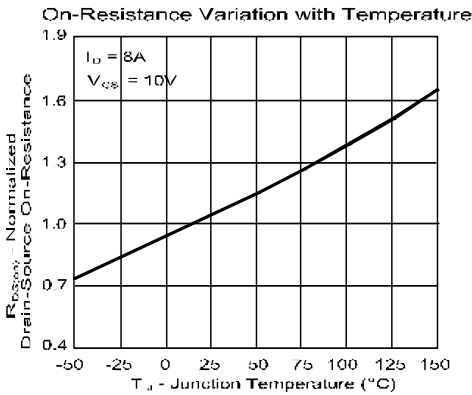
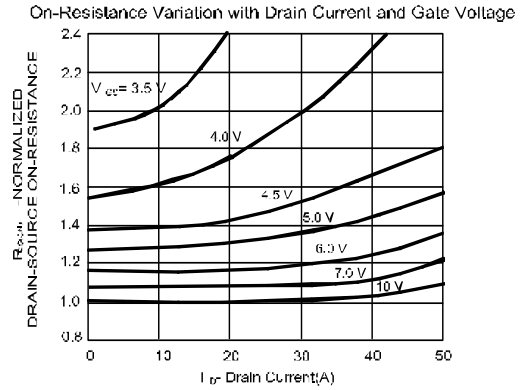
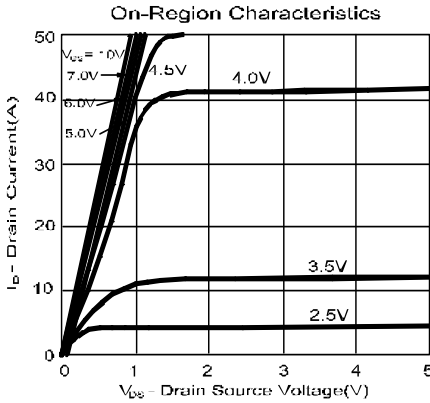
NOTE :

1. Pulse test : Pulse width $\leq$ 300 μ sec, duty cycle $\leq$ 2%.
2. Independent of operating temperature.
3. Pulse width limited by maximum junction temperature.

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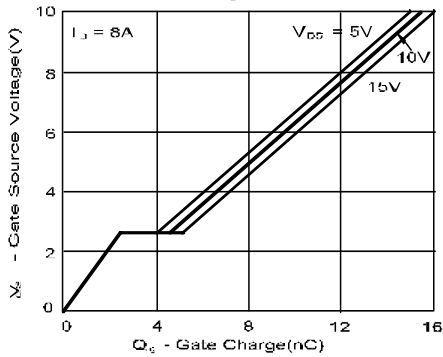
Typical Electrical and Thermal Characteristics (N-ch)



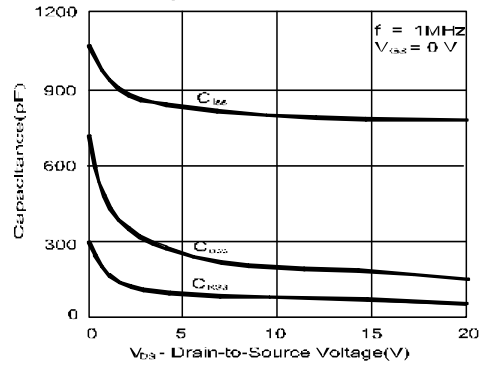
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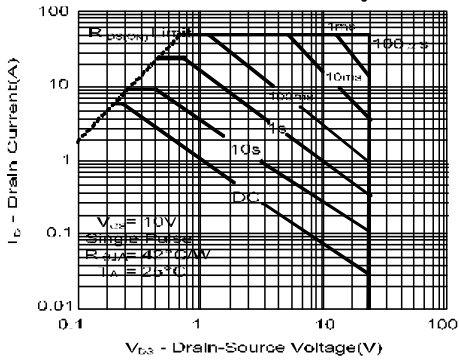
Gate Charge Characteristics



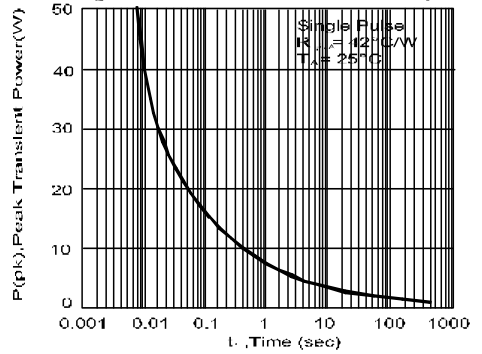
Capacitance Characteristics



Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



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■ Electrical Characteristics (P-ch)

T_a=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
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	-1.0	-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=-6A		34	45	mΩ	1
		Vgs=-4.5V, Id=-5A		58	80		
Forward transconductance	Gfs	Vds=-10V, Id=-6A		11		S	1
Diode forward voltage	Vsd	If=-3A, Vgs=0V			-1.3	V	1
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=-10V, f=1MHz		690		pF	
Output capacitance	Coss			310		pF	
Reverse transfer capacitance	Crss			75		pF	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=-10V, Vds=-15V Id=-6A		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=-10V 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=-6A, dI/dt=100A/μs		55		ns	
Body diode reverse recovery charge	Qrr			52		nC	

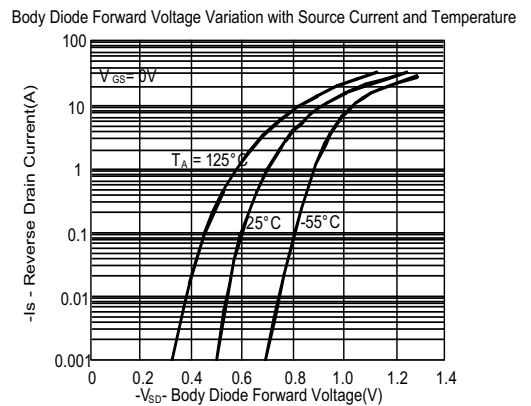
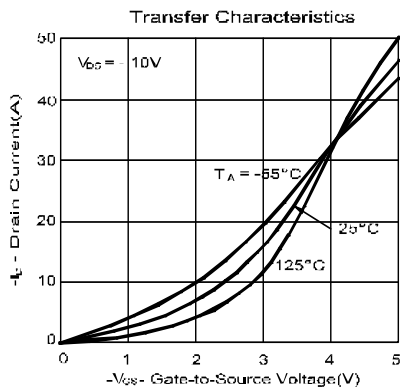
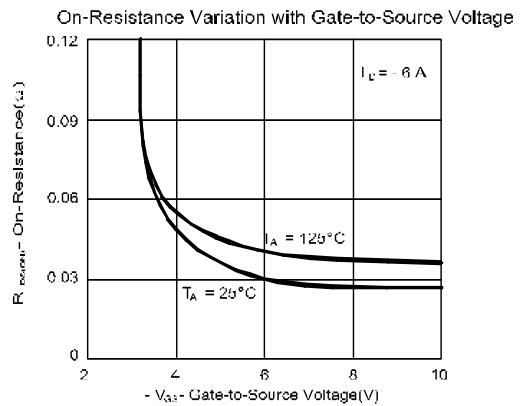
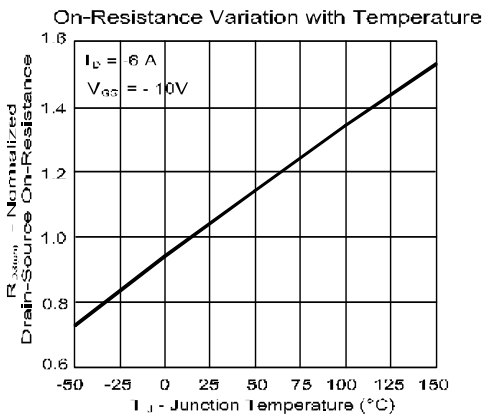
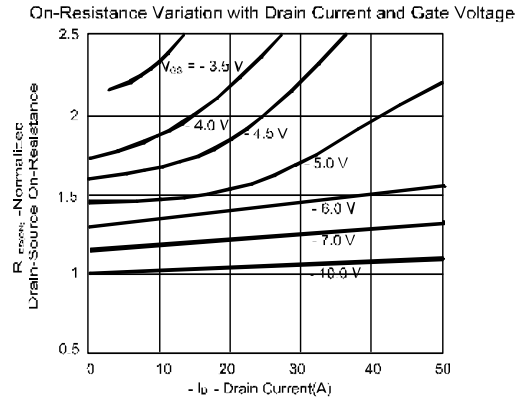
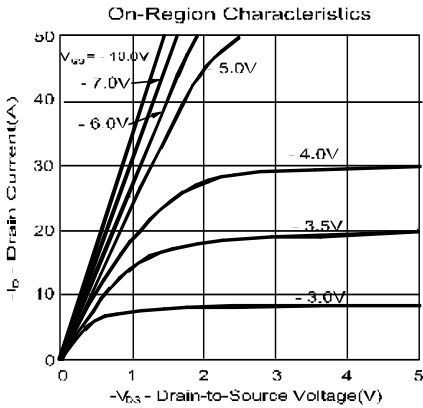
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