

Complementary MOSFET

ELM36600EA-S

General Description

ELM36600EA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

Features

- | | |
|--|--|
| N-channel | P-channel |
| • $V_{ds}=30V$ | $V_{ds}=-30V$ |
| • $I_d=3.5A$ | $I_d=-2A$ |
| • $R_{ds(on)} < 68m\Omega$ ($V_{gs}=10V$) | $R_{ds(on)} < 145m\Omega$ ($V_{gs}=-10V$) |
| • $R_{ds(on)} < 98m\Omega$ ($V_{gs}=4.5V$) | $R_{ds(on)} < 245m\Omega$ ($V_{gs}=-4.5V$) |

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	3.5	-2.3	A	
	$T_a=70^{\circ}C$		2.8	-1.8		
Pulsed drain current		I_{dm}	10	-10	A	1
Power dissipation	$T_a=25^{\circ}C$	P_d	1.15	1.15	W	
	$T_a=70^{\circ}C$		0.73	0.73		
Junction and storage temperature range		T_j, T_{stg}	-55 to 150	-55 to 150	$^{\circ}C$	

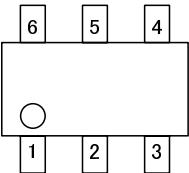
Thermal Characteristics

Parameter		Symbol	Device	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$t \leq 5s$	$R\theta_{ja}$	N-ch		110	$^{\circ}C/W$	
Maximum junction-to-ambient	Steady-state				150		
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$			80		
Maximum junction-to-ambient	$t \leq 5s$	$R\theta_{ja}$	P-ch		110	$^{\circ}C/W$	
Maximum junction-to-ambient	Steady-state				150		
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$			80		

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

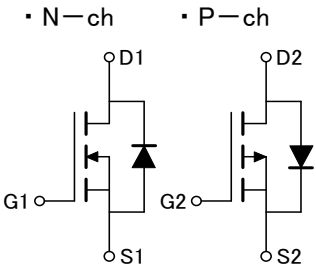
Pin Configuration

SOT-26 (TOP VIEW)



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

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 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	1.0	1.5	2.5	V	
On state drain current	I _{d(on)}	V _{gs} =10V, V _{ds} =5V	8			A	1
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =3.5A		55	68	mΩ	1
		V _{gs} =4.5V, I _d =2A		75	98		
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =2.5A		4.5		S	1
Diode forward voltage	V _{sd}	I _f =0.8A, V _{gs} =0V			1.2	V	1
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =15V, f=1MHz		200		pF	
Output capacitance	C _{oss}			40		pF	
Reverse transfer capacitance	C _{rss}			20		pF	
SWITCHING PARAMETERS							
Total gate charge	Q _g	V _{gs} =10V, V _{ds} =15V, I _d =2.5A		6.5	8.5	nC	2
Gate-source charge	Q _{gs}			1.2		nC	2
Gate-drain charge	Q _{gd}			1.6		nC	2
Turn-on delay time	t _{d(on)}	V _{gs} =10V, V _{ds} =15V, I _d ≈ 1A R _L =15 Ω, R _{gen} =6 Ω		7	11	ns	2
Turn-on rise time	t _r			12	18	ns	2
Turn-off delay time	t _{d(off)}			12	18	ns	2
Turn-off fall time	t _f			7	11	ns	2
Body-diode reverse recovery time	t _{rr}	I _f =0.8A, dI/dt=100A/μs		40	80	ns	

NOTE :

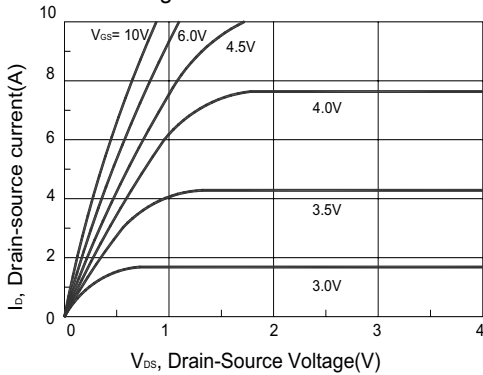
1. Pulse test : Pulse width ≤ 300 μsec, duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulse width limited by maximum junction temperature.

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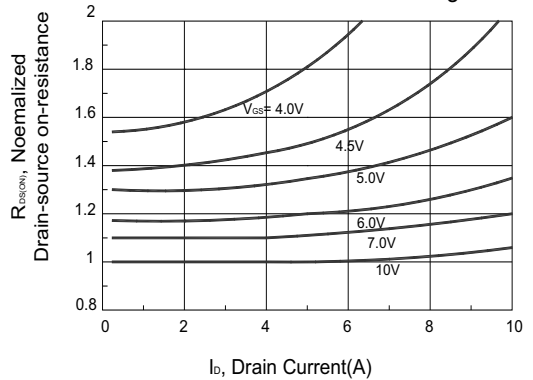
ELM36600EA-S

Typical Electrical and Thermal Characteristics (N-ch)

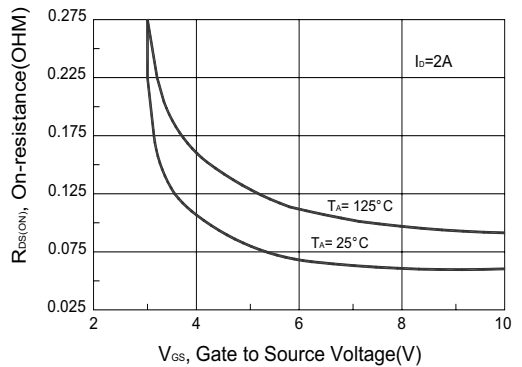
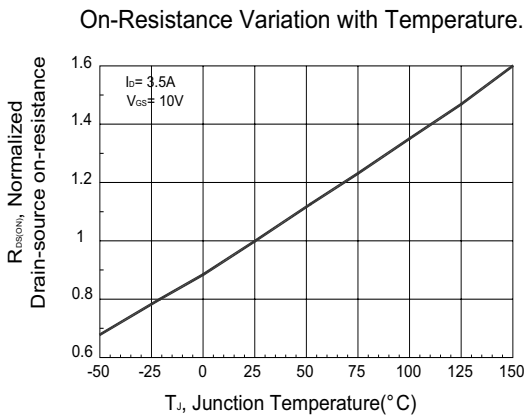
On-Region Characteristics.



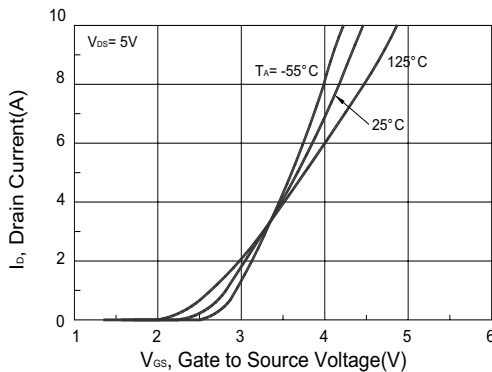
On-Resistance Variation with Drain Current and Gate Voltage.



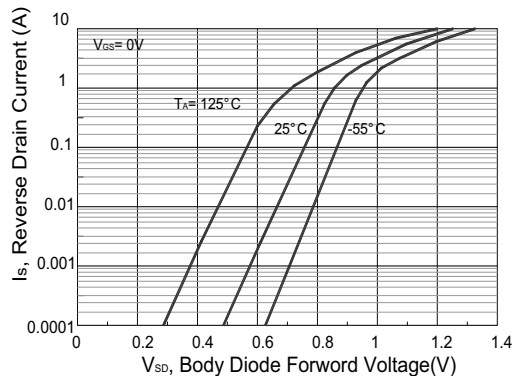
On-Resistance Variation with Gate-to-Source Voltage.



Transfer Characteristics.



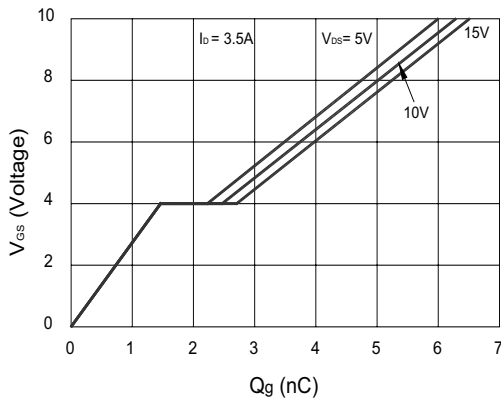
Body Diode Forward Voltage Variation with Source Current and Temperature.



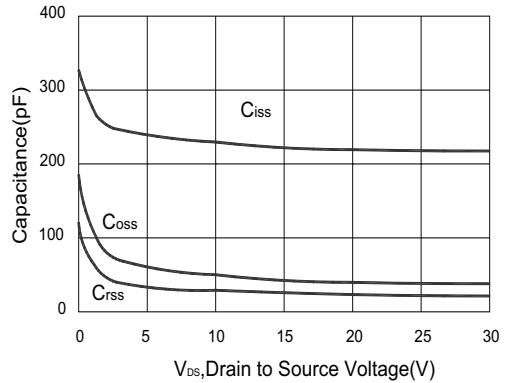
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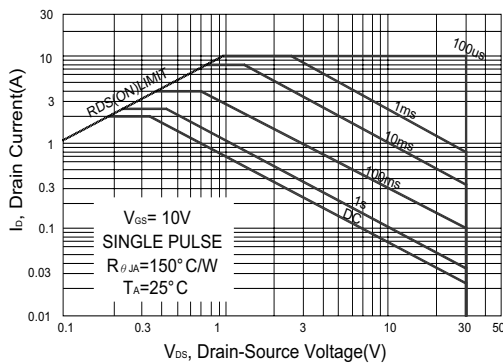
Gate-Charge Characteristics



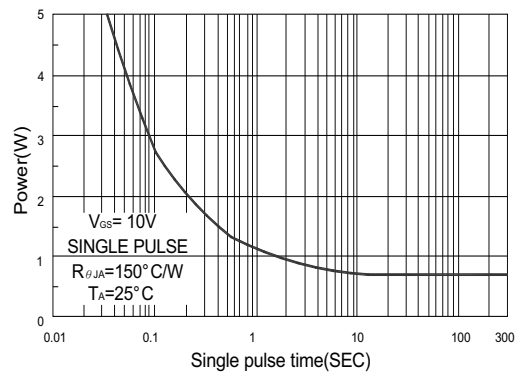
Capacitance Characteristics



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	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	μ A	
		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 μ A	-1.0	-1.5	-2.5	V	
On state drain current	I _{d(on)}	V _{gs} =-10V, V _{ds} =-5V	-8			A	1
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =-10V, I _d =-2.3A		115	145	mΩ	1
		V _{gs} =-4.5V, I _d =-1.5A		185	245		
Forward transconductance	G _{fs}	V _{ds} =-5V, I _d =-2A		3		S	1
Diode forward voltage	V _{sd}	I _f =-0.8A, V _{gs} =0V			-1.2	V	1
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =-15V, f=1MHz		190		pF	
Output capacitance	C _{oss}			60		pF	
Reverse transfer capacitance	C _{rss}			30		pF	
SWITCHING PARAMETERS							
Total gate charge	Q _g	V _{gs} =-10V, V _{ds} =-15V I _d =-2A		4.5	6.0	nC	2
Gate-source charge	Q _{gs}			1.2		nC	2
Gate-drain charge	Q _{gd}			0.9		nC	2
Turn-on delay time	t _{d(on)}	V _{gs} =-10V, V _{ds} =-15V I _d ≈ -1A, R _l =15 Ω R _{gen} =6 Ω		8	12	ns	2
Turn-on rise time	t _r			11	18	ns	2
Turn-off delay time	t _{d(off)}			14	21	ns	2
Turn-off fall time	t _f			8	12	ns	2
Body-diode reverse recovery time	t _{rr}	I _f =-0.8A, dI/dt=100A/μ s		40	80	ns	

NOTE :

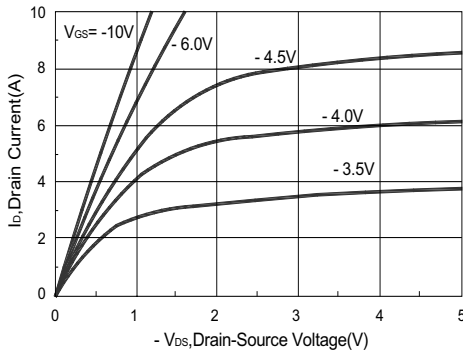
1. Pulse test : Pulse width ≤ 300μsec, duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulse width limited by maximum junction temperature.

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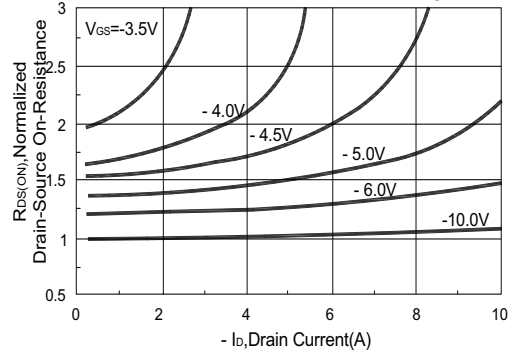
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Typical Electrical and Thermal Characteristics (P-ch)

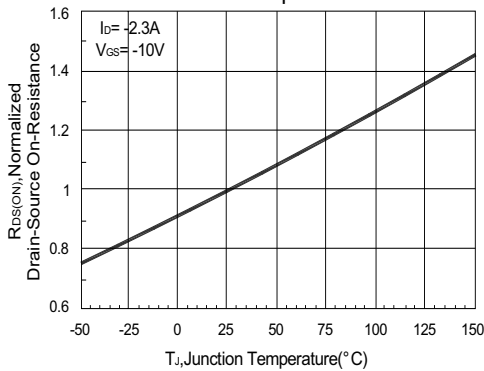
On-Region Characteristics



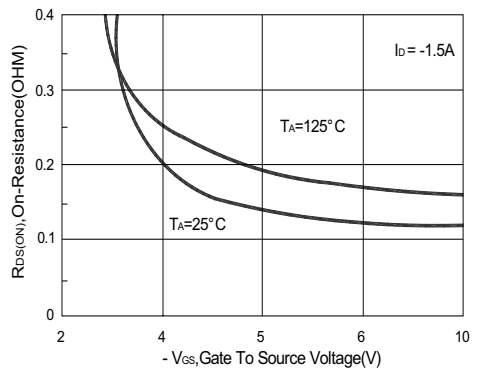
On-Resistance Variation with Drain Current and Gate Voltage.



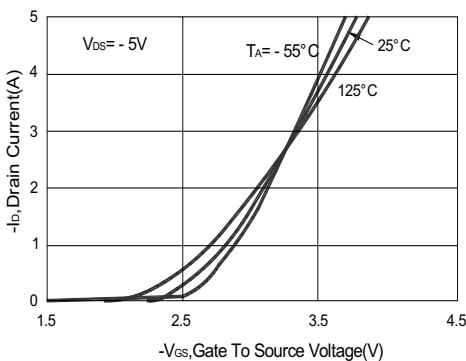
On-Resistance Variation with Temperature



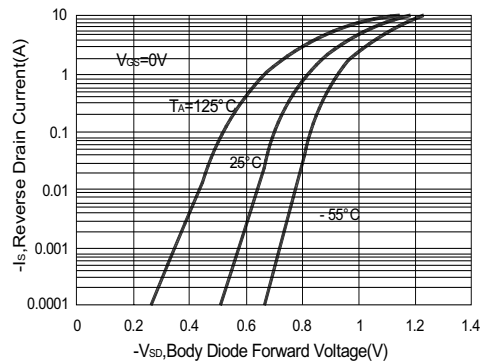
On-Resistance Variation with Gate-to-Source Voltage.



Transfer Characteristics



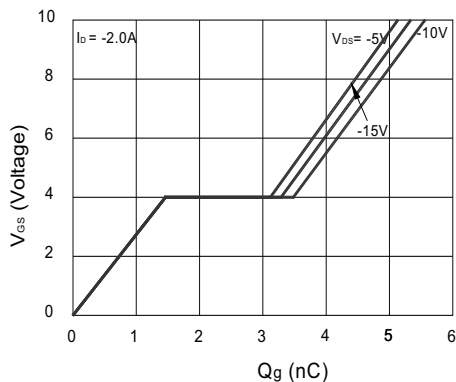
Body Diode Forward Voltage Variation With Source Current and Temperature.



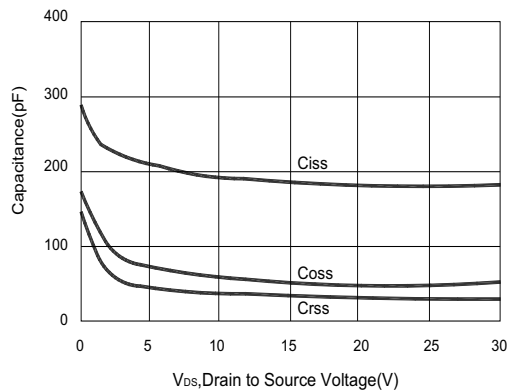
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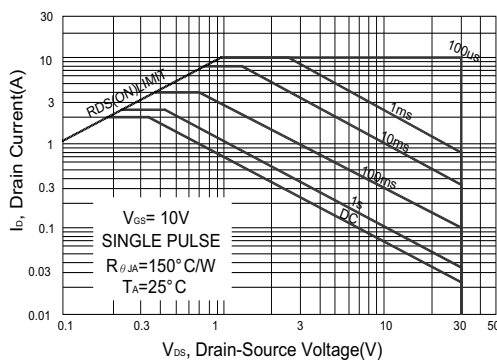
Gate-Charge Characteristics



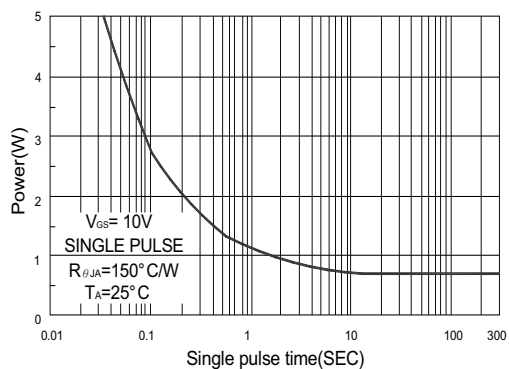
Capacitance Characteristics



Maximum Safe Operating Area.



Single Pulse Maximum Power Dissipation.



Transient Thermal Response Curve.

