

Single N-channel MOSFET

ELM57002ESA-S

<http://www.elm-tech.com>

■ General description

ELM57002ESA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage. ESD protection is included.

■ Features

- $V_{ds}=60V$
- $I_d=0.115A$
- $R_{ds(on)} = 2.4\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} = 3.0\Omega$ ($V_{gs}=4.5V$)
- ESD Rating : 2KV

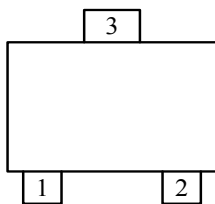
■ Maximum absolute ratings

$T_a=25^\circ C$. Unless otherwise noted.

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{ds}	60	V
Gate-source voltage	V_{gs}	± 20	V
Continuous drain current $T_j=150^\circ C$	I_d	$T_a=25^\circ C$	0.115
		$T_a=70^\circ C$	0.075
Pulsed drain current	I_{dm}	0.8	A
Power dissipation	P_d	$T_c=25^\circ C$	0.27
		$T_c=70^\circ C$	0.16
Junction and storage temperature range	T_j, T_{stg}	-55 to 150	$^\circ C$

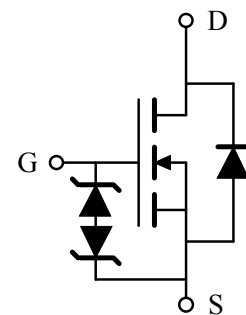
■ Pin configuration

SOT-723(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

■ Circuit



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■ Electrical characteristics

Ta=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	I _d =250μA, V _{gs} =0V	60			V	
Zero gate voltage drain current	I _{dss}	V _{ds} =60V, V _{gs} =0V Ta=85°C			1	μA	
					10		
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±20V			3	μA	
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250μA	1.0		2.0	V	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =0.5A		1.2	2.4	Ω	
		V _{gs} =4.5V, I _d =0.05A		1.6	3.0		
Forward transconductance	G _{fs}	V _{ds} =10V, I _d =0.2A		0.2		S	
Diode forward voltage	V _{sd}	I _s =0.2A, V _{gs} =0V		0.75	1.40	V	
Max. body-diode continuous current	I _s				0.3	A	
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =25V, f=1MHz		30		pF	
Output capacitance	C _{oss}				8		pF
Reverse transfer capacitance	C _{rss}				5		pF
SWITCHING PARAMETERS							
Total gate charge	Q _g	V _{gs} =4.5V, V _{ds} =10V I _d ≅0.25A		500		pC	
Gate-source charge	Q _{gs}			100		pC	
Gate-drain charge	Q _{gd}			150		pC	
Turn-on delay time	t _{d(on)}	V _{gs} =4.5V, V _{ds} =30V R _L =150Ω, I _d ≅0.2A R _{gen} =10Ω		10	20	ns	
Turn-on rise time	t _r			35	50	ns	
Turn-off delay time	t _{d(off)}			20	30	ns	
Turn-off fall time	t _f			40	60	ns	

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■ Typical electrical and thermal characteristics

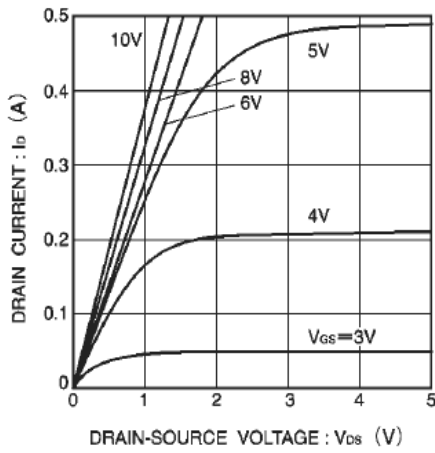


Fig.1 Typical output characteristics

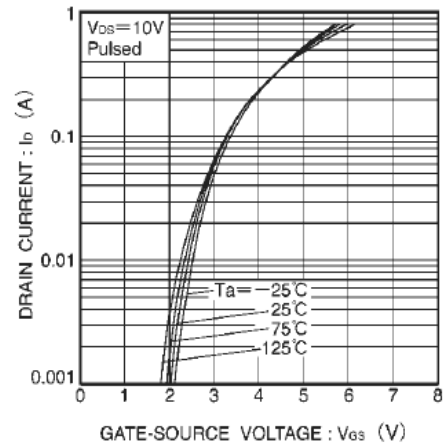


Fig.2 Typical transfer characteristics

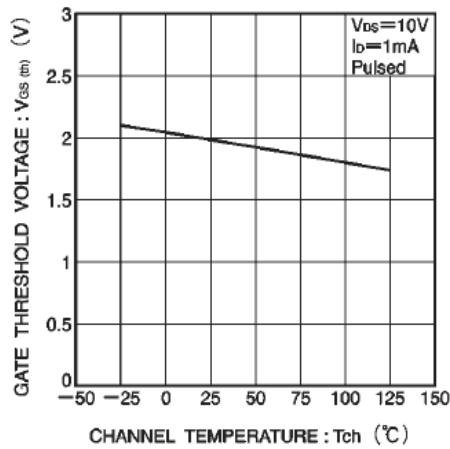


Fig.3 Gate threshold voltage vs. channel temperature

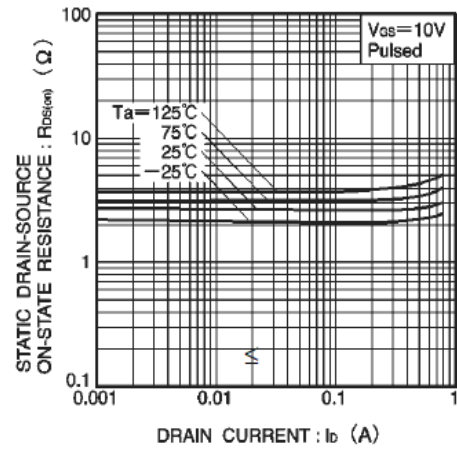


Fig.4 Static drain-source on-state resistance vs. drain current

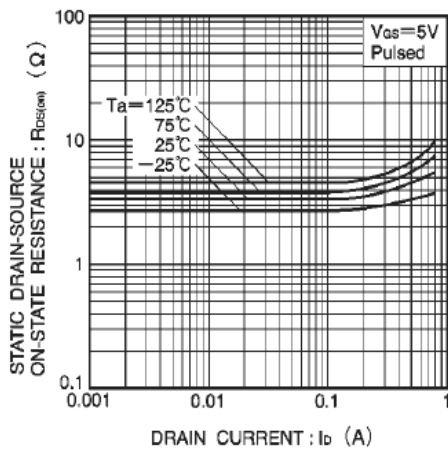


Fig.5 Static drain-source on-state resistance vs. drain current

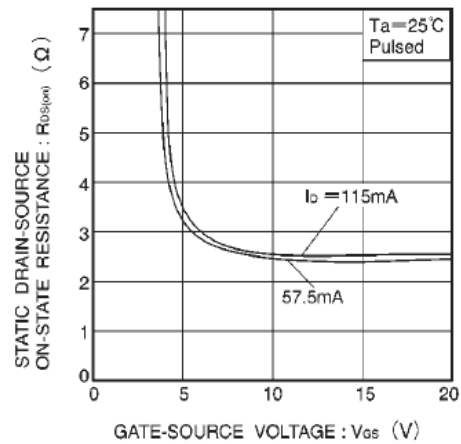


Fig.6 Static drain-source on-state resistance vs. gate-source voltage

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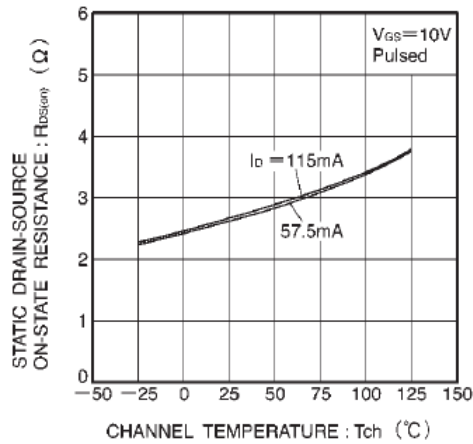


Fig.7 Static drain-source on-state resistance vs. channel temperature

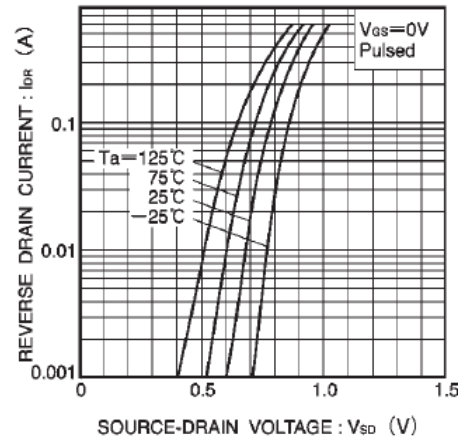


Fig.8 Reverse drain current vs. source-drain voltage

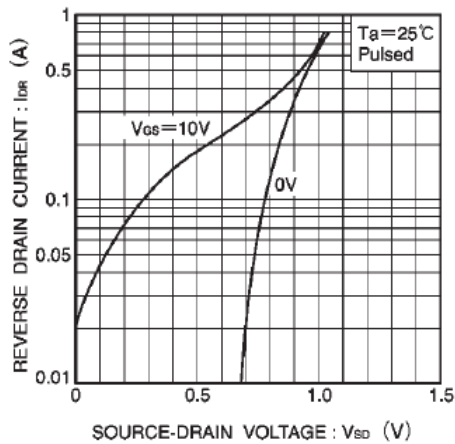


Fig.9 Reverse drain current vs. source-drain voltage

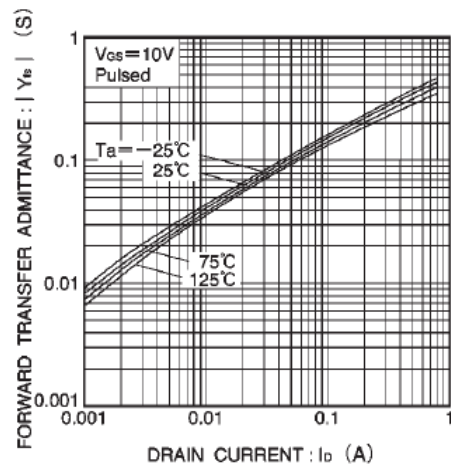


Fig.10 Forward transfer admittance vs. drain current

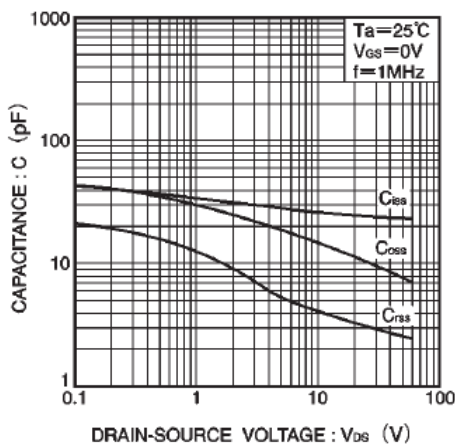


Fig.11 Typical capacitance vs. drain-source voltage

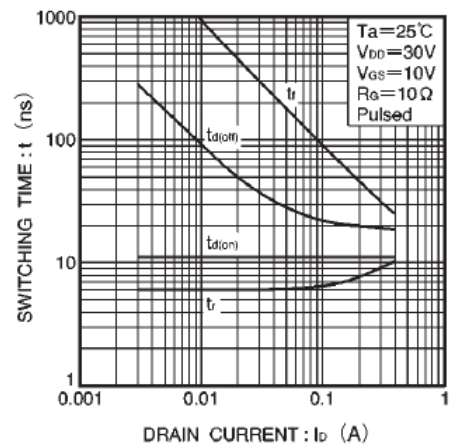


Fig. Switching characteristics

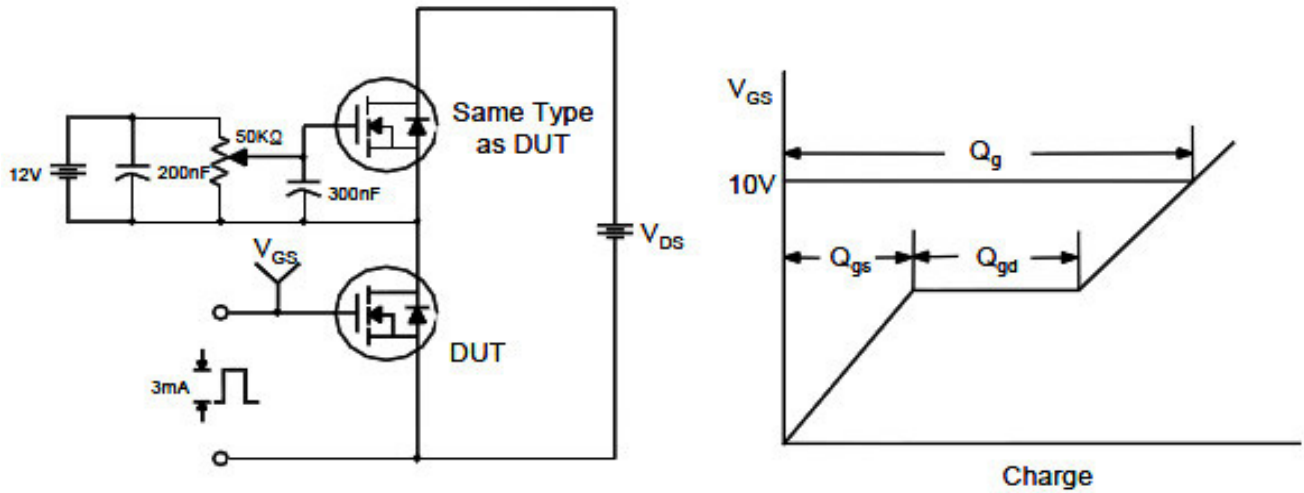
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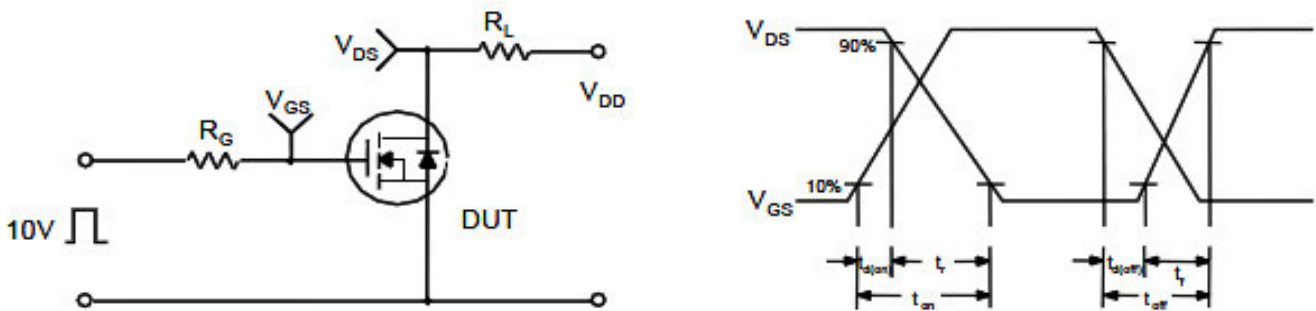
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■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

