Single N-channel MOSFET

ELM33414CA-S

■General description

ELM33414CA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and operation with gate voltages as low as 3.5V and internal ESD protection is included.

■Features

- Vds=60V
- Id=300mA
- Rds(on) < 2Ω (Vgs=10V)
- Rds(on) < 3Ω (Vgs=4.5V)
- Rds(on) < 5Ω (Vgs=3.5V)
- ESD Rating : 2000V HBM

■Maximum absolute ratings

Ta=25°C. Unless otherwise noted.

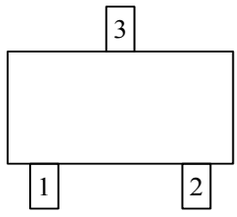
Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	60	V	
Gate-source voltage		Vgs	±20	V	
Continuous drain current	Ta=25°C	Id	300	mA	
	Ta=100°C		190		
Pulsed drain current		Idm	1	A	3
Power dissipation	Tc=25°C	Pd	0.35	W	
	Tc=100°C		0.14		
Junction and storage temperature range		Tj, Tstg	-40 to 150	°C	

■Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	Rθja		350	°C/W	

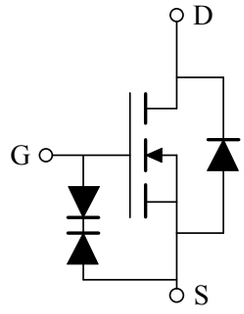
■Pin configuration

SOT-23(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

■Circuit



■Electrical characteristics

Ta=25°C. Unless otherwise noted.

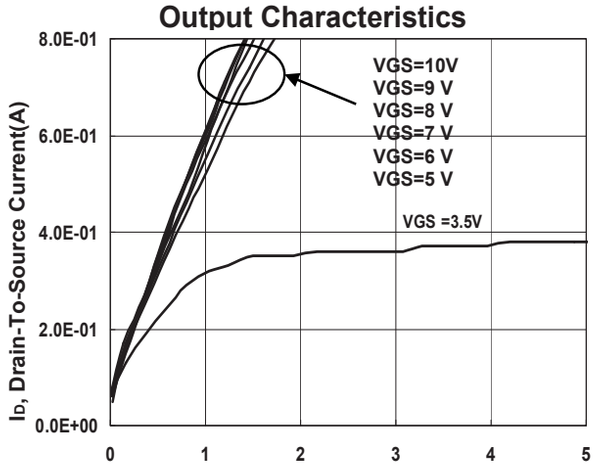
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=100μA, Vgs=0V	60			V	
Zero gate voltage drain current	Idss	Vds=48V, Vgs=0V			1	μA	
		Vds=40V, Vgs=0V, Ta=125°C			10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±16V			±30	μA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=100μA	1.0	1.8	2.5	V	
On state drain current	Id(on)	Vgs=10V, Vds=10V	1			A	1
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=200mA		1.6	2.0	Ω	1
		Vgs=4.5V, Id=100mA		1.7	3.0		
		Vgs=3.5V, Id=10mA		2.1	5.0		
Forward transconductance	Gfs	Vds=20V, Id=200mA		0.18		S	1
Diode forward voltage	Vsd	If=200mA, Vgs=0V			1.2	V	1
Max. body-diode continuous current	Is	If=200mA, Vgs=0V			300	mA	
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=25V, f=1MHz		36		pF	
Output capacitance	Coss			10		pF	
Reverse transfer capacitance	Crss			6		pF	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=10V, Vds=30V Id=200mA		1.6		nC	2
Gate-source charge	Qgs			0.2		nC	2
Gate-drain charge	Qgd			1.0		nC	2
Turn-on delay time	td(on)	Vds=30V, Vgs=10V Id=200mA, Rgen=10Ω		30		ns	2
Turn-off delay time	td(off)			125		ns	2

NOTE :

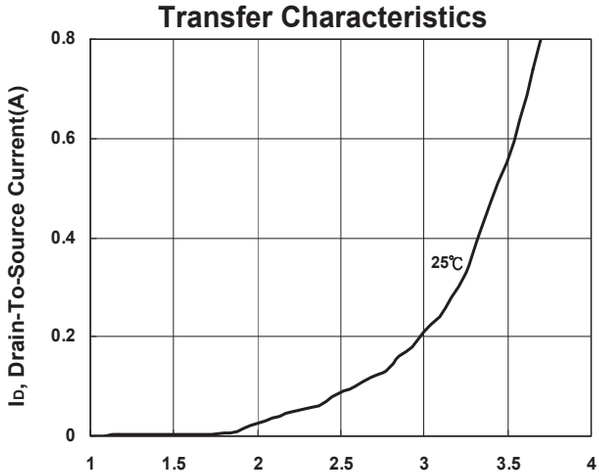
1. Pulse test : Pulsed width ≤ 300μsec and Duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulsed width limited by maximum junction temperature.

■Typical electrical and thermal characteristics

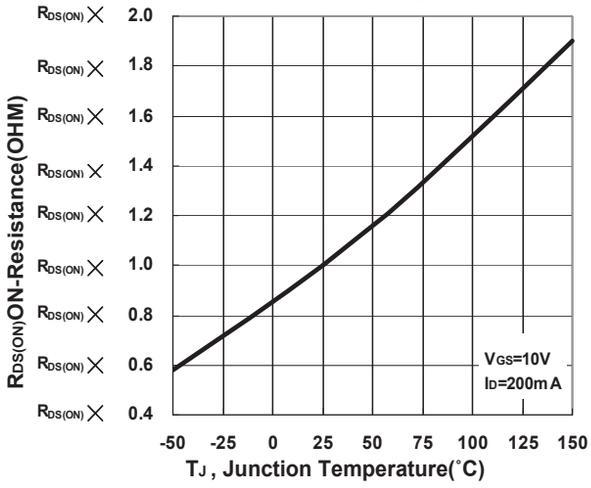
Output Characteristics



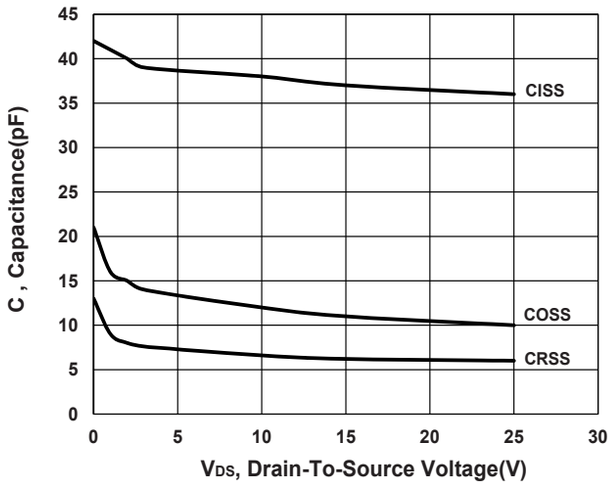
Transfer Characteristics



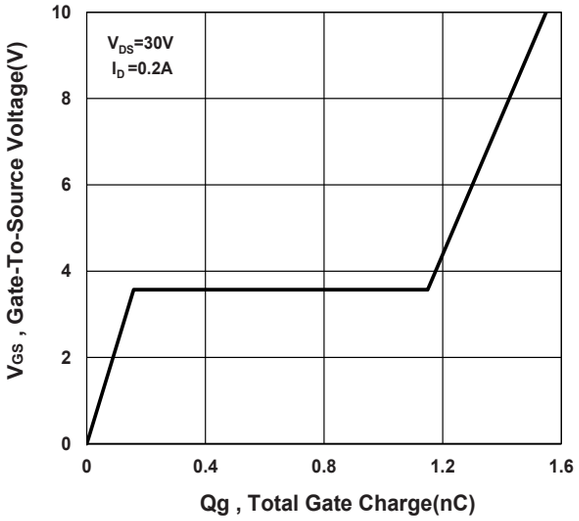
On-Resistance VS Temperature



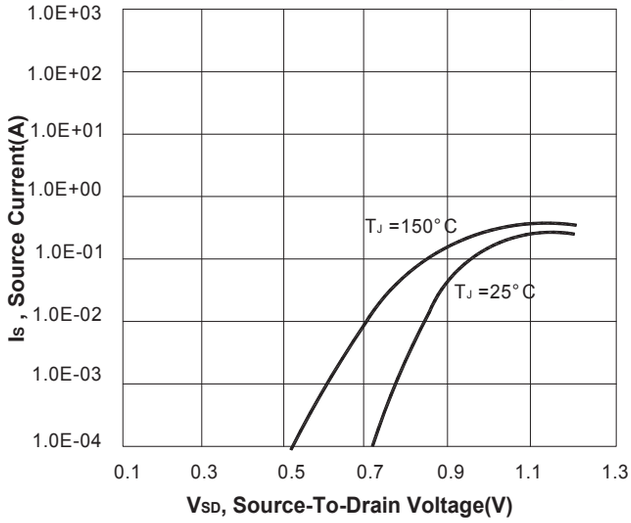
Capacitance Characteristic

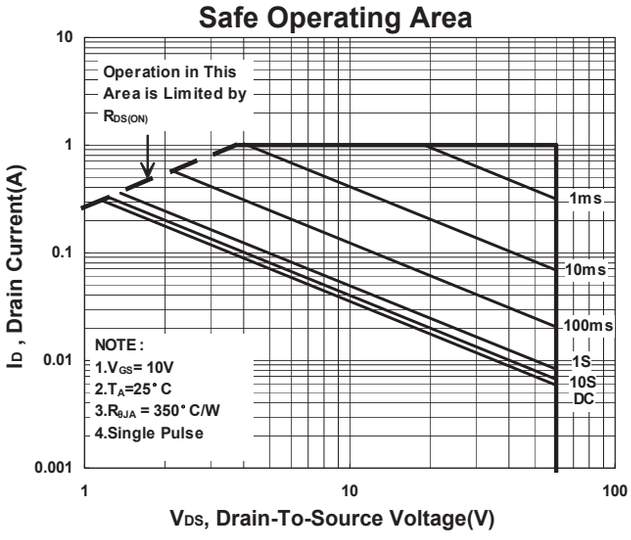


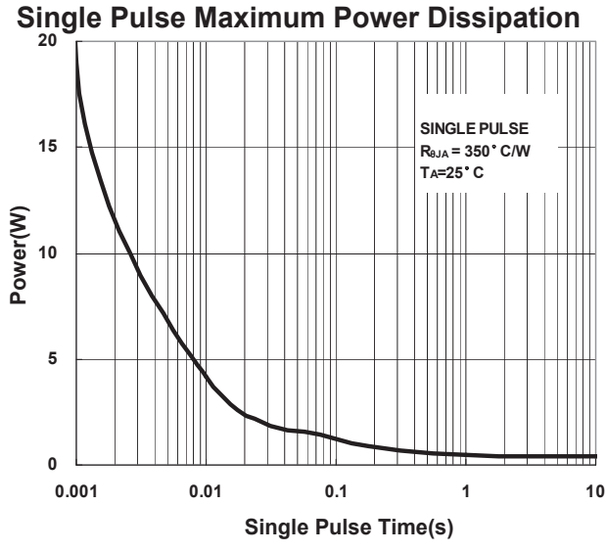
Gate charge Characteristics

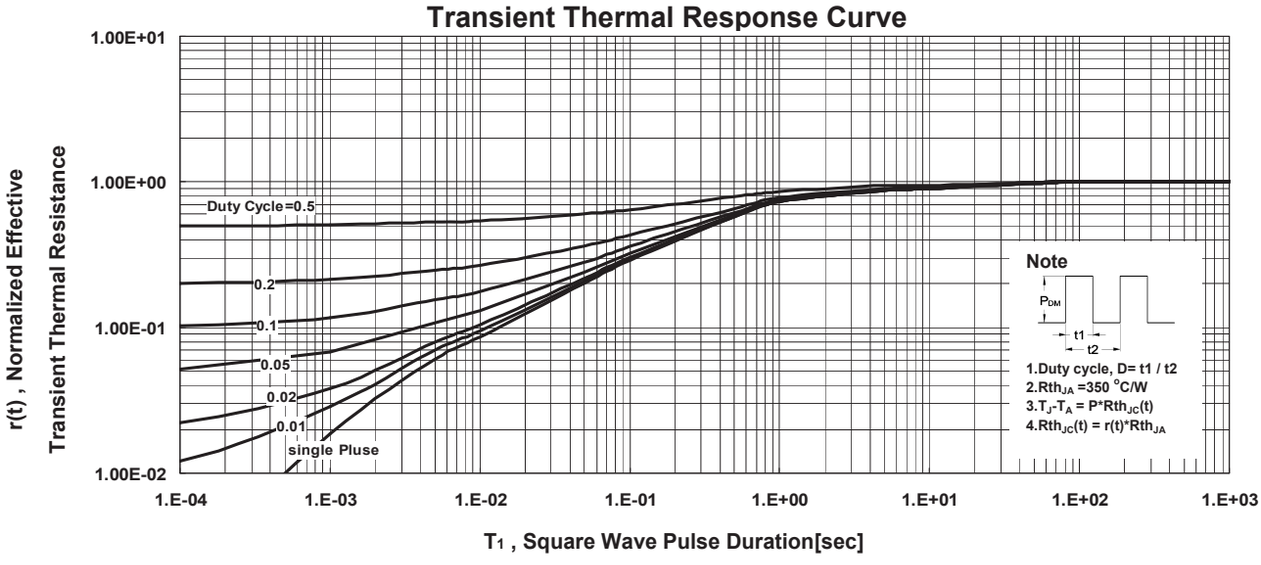


Source-Drain Diode Forward Voltage




Safe Operating Area
Operation in This
Area is Limited by
RDS(ON)
1ms
10ms
100ms
1S
10S
DC
NOTE :
1.VGS= 10V
2.TA=25° C
3.RθJA = 350° C/W
4.Single Pulse
ID , Drain Current(A)
VDS, Drain-To-Source Voltage(V)
10
1
0.1
0.01
0.001
1
10
100


Single Pulse Maximum Power Dissipation
SINGLE PULSE
RθJA = 350° C/W
TA=25° C
Power(W)
Single Pulse Time(s)
20
15
10
5
0
0.001
0.01
0.1
1
10


Transient Thermal Response Curve
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
single Pluse
Note
PDM
t1
t2
1.Duty cycle, D= t1 / t2
2.RthJA =350 °C/W
3.TJ-TA = P*RthJC(t)
4.RthJC(t) = r(t)*RthJA
r(t) , Normalized Effective
Transient Thermal Resistance
T1 , Square Wave Pulse Duration[sec]
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.E-04
1.E-03
1.E-02
1.E-01
1.E+00
1.E+01
1.E+02
1.E+03