Complementary MOSFET

ELM36601EA-S

■General Description

ELM36601EA-S uses advanced trench technology to provide excellent Rds(on) and low gate charge.

■Features

N-channel	P-channel
• Vds=30V	Vds=-30V
• Id=3.5A	Id=-2A
• Rds(on) < 58mΩ(Vgs=10V)	Rds(on) < 115mΩ(Vgs=-10V)
• Rds(on) < 88mΩ(Vgs=4.5V)	Rds(on) < 185mΩ(Vgs=-4.5V)

■Maximum Absolute Ratings

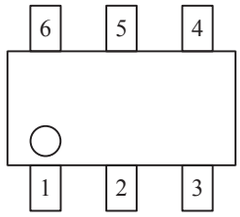
Parameter		Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note
Drain-source voltage		Vds	30	-30	V	
Gate-source voltage		Vgs	±20	±20	V	
Continuous drain current	Ta=25°C	Id	3.5	-2.3	A	
	Ta=70°C		2.8	-1.8		
Pulsed drain current		Idm	10	-10	A	3
Power dissipation	Ta=25°C	Pd	1.15	1.15	W	
	Ta=70°C		0.73	0.73		
Junction and storage temperature range		Tj,Tstg	-55 to 150	-55 to 150	°C	

■Thermal Characteristics

Parameter		Symbol	Device	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	t≤5s	Rθja	N-ch		110	°C/W	
Maximum junction-to-ambient	Steady-state				150		
Maximum junction-to-lead	Steady-state	Rθjl			80		
Maximum junction-to-ambient	t≤5s	Rθja	P-ch		110	°C/W	
Maximum junction-to-ambient	Steady-state				150		
Maximum junction-to-lead	Steady-state	Rθjl			80		

■Pin Configuration

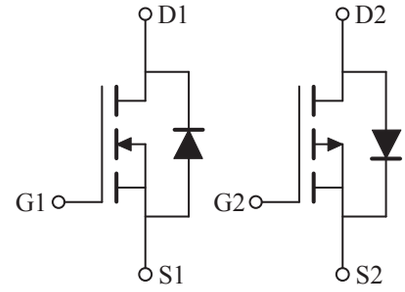
SOT-26(TOP VIEW)



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

■Circuit

• N-ch • P-ch



■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	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	8			A	1
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=3.5A		50	58	mΩ	1
		Vgs=4.5V, Id=2A		69	88		
Forward transconductance	Gfs	Vds=5V, Id=2.5A		4.5		S	1
Diode forward voltage	Vsd	If=0.8A, Vgs=0V			1.2	V	1
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=15V, f=1MHz		202		pF	
Output capacitance	Coss			40		pF	
Reverse transfer capacitance	Crss			20		pF	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=10V, Vds=15V, Id=3.5A		2.6	3.9	nC	2
Gate-source charge	Qgs			0.9		nC	2
Gate-drain charge	Qgd			0.6		nC	2
Turn-on delay time	td(on)	Vgs=10V, Vds=15V, Id≈1A RL=15Ω, Rgen=6Ω		7	11	ns	2
Turn-on rise time	tr			12	18	ns	2
Turn-off delay time	td(off)			12	18	ns	2
Turn-off fall time	tf			7	11	ns	2
Body-diode reverse recovery time	trr	If=0.8A, dl/dt=100A/μs		40	80	ns	

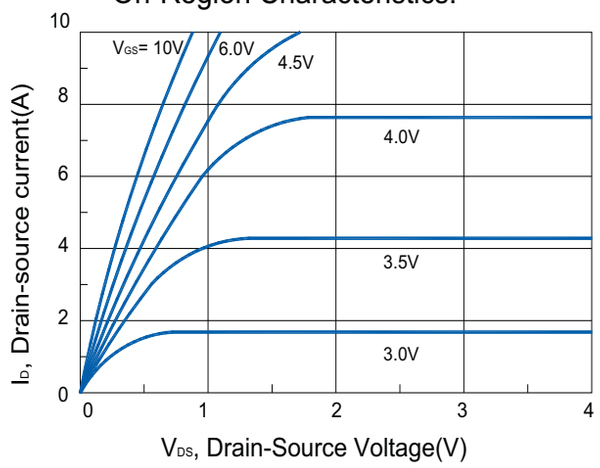
NOTE :

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

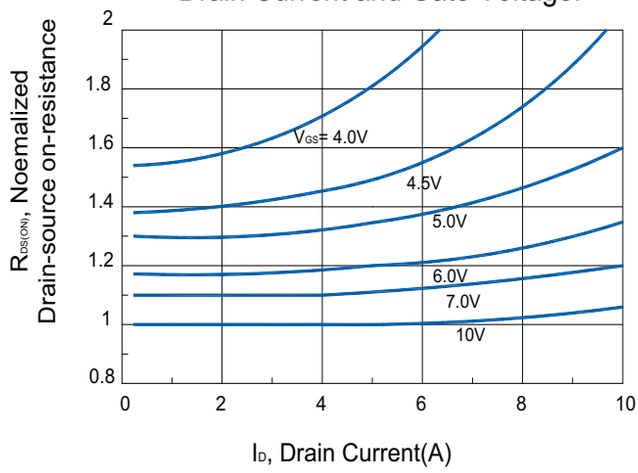
■Typical Electrical and Thermal Characteristics

N-CHANNEL

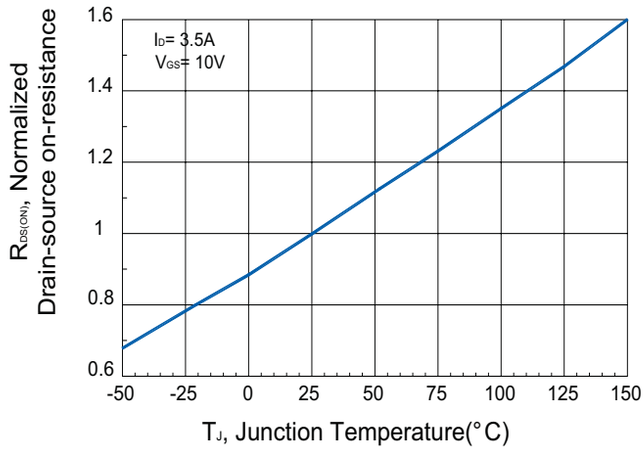
On-Region Characteristics.



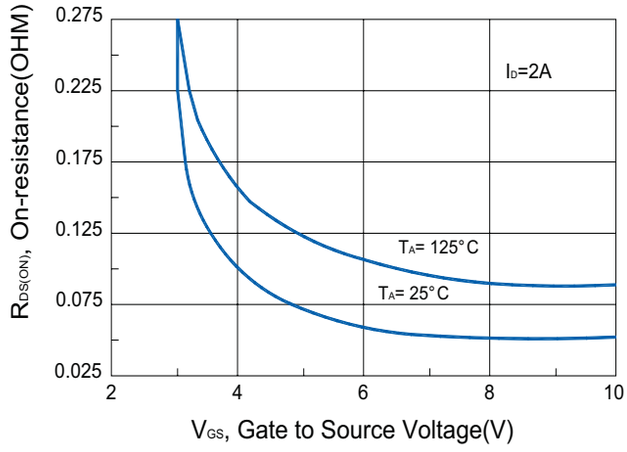
On-Resistance Variation with Drain Current and Gate Voltage.



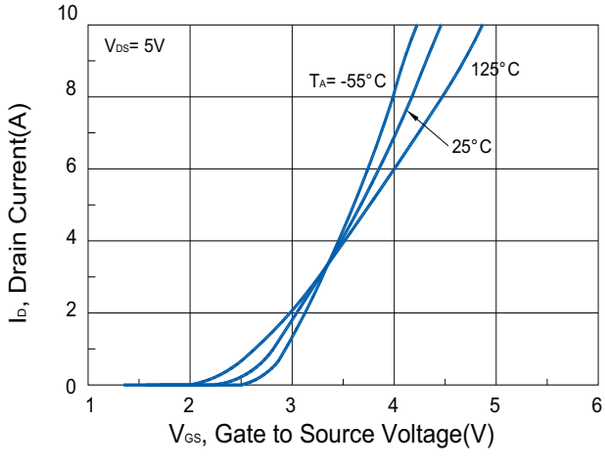
On-Resistance Variation with Temperature.



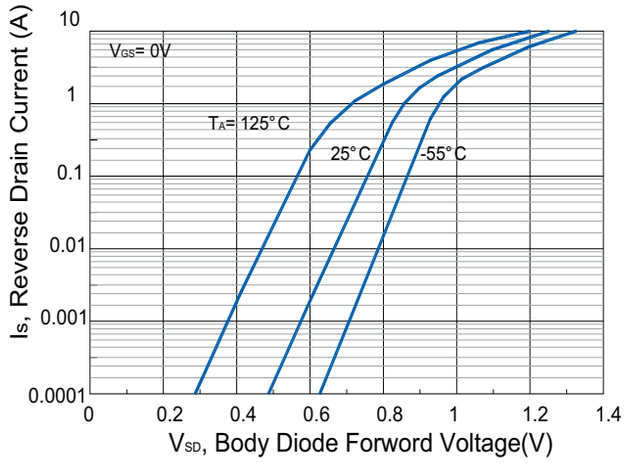
On-Resistance Variation with Gate-to-Source Voltage.



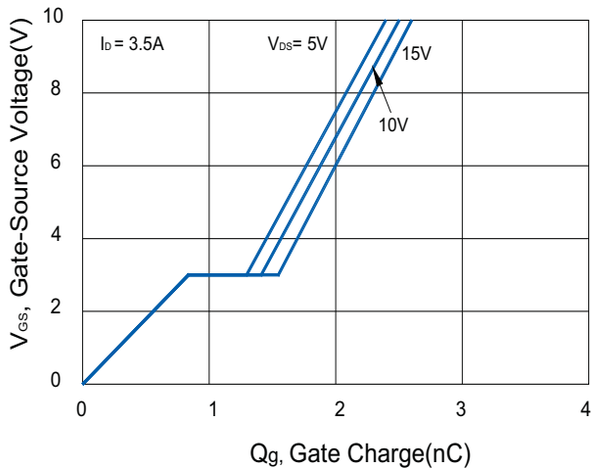
Transfer Characteristics.



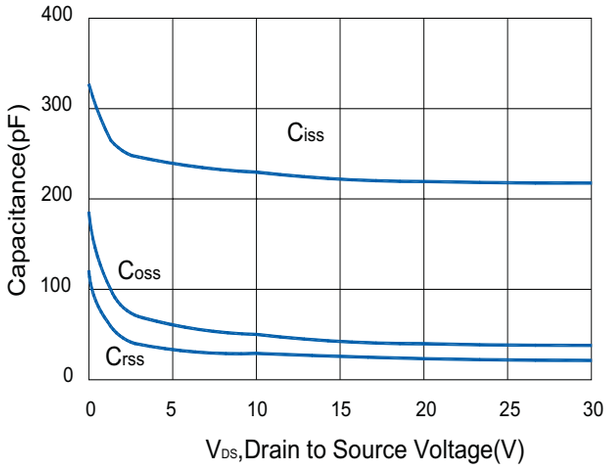
Body Diode Forword Voltage Variation with Source Current and Temperature.



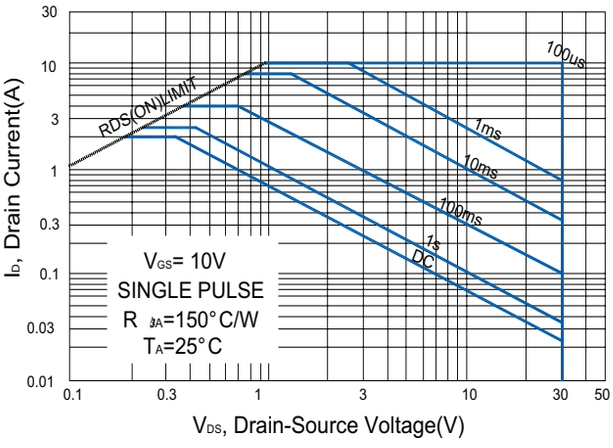
Gate-Charge Characteristics



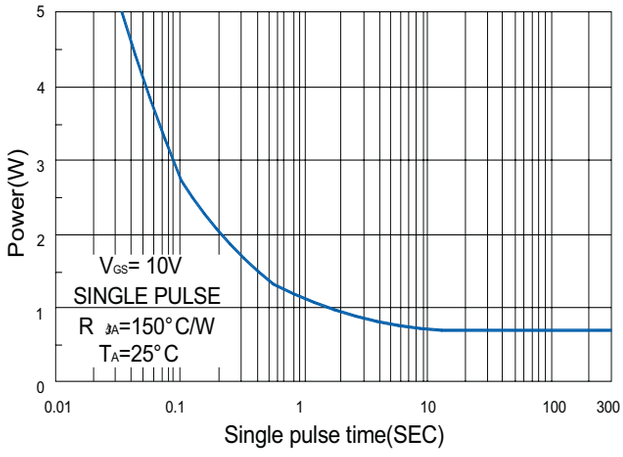
Capacitance Characteristics



Maximum Safe Operating Area.



Single Pulse Maximum Power Dissipation.



■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	-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	-8			A	1
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-2.3A		95	115	mΩ	1
		Vgs=-4.5V, Id=-1.5A		145	185		
Forward transconductance	Gfs	Vds=-5V, Id=-2A		3		S	1
Diode forward voltage	Vsd	If=-0.8A, Vgs=0V			-1.2	V	1
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=-15V, f=1MHz		225		pF	
Output capacitance	Coss			60		pF	
Reverse transfer capacitance	Crss			30		pF	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=-10V, Vds=-15V Id=-2A		2.8	4.2	nC	2
Gate-source charge	Qgs			1.0		nC	2
Gate-drain charge	Qgd			0.7		nC	2
Turn-on delay time	td(on)	Vgs=-10V, Vds=-15V, Id≈-1A RL=15Ω, Rgen=6Ω		8	12	ns	2
Turn-on rise time	tr			11	18	ns	2
Turn-off delay time	td(off)			14	21	ns	2
Turn-off fall time	tf			8	12	ns	2
Body-diode reverse recovery time	trr	If=-0.8A, dl/dt=100A/μs		40	80	ns	

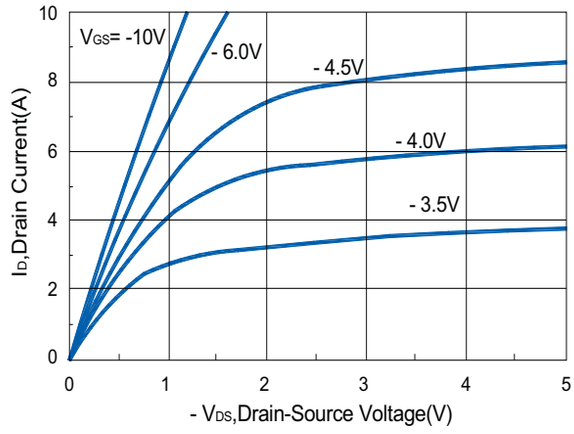
NOTE :

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

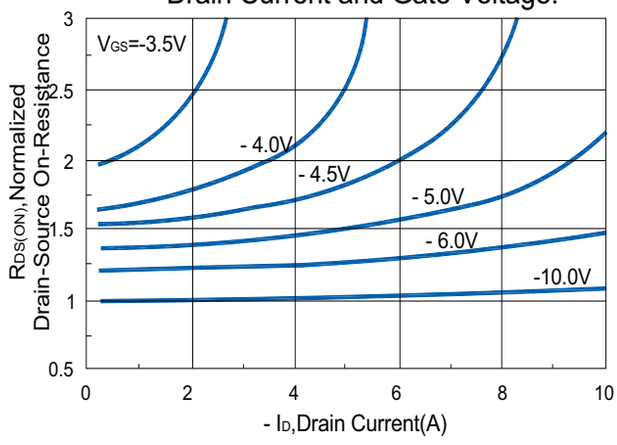
■Typical Electrical and Thermal Characteristics

P-CHANNEL

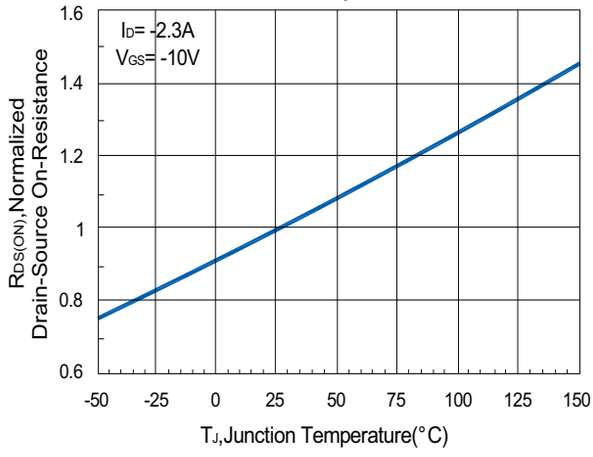
On-Region Characteristics



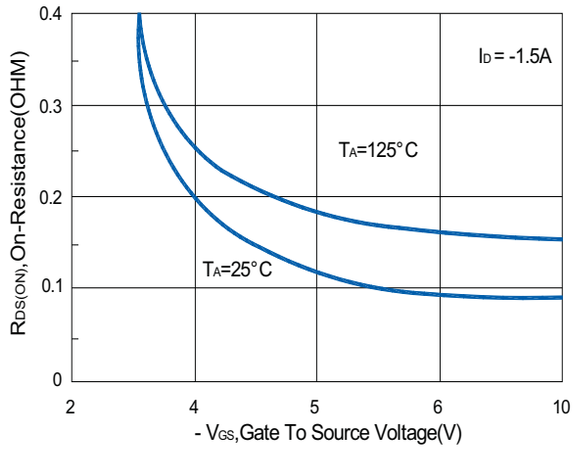
On-Resistance Variation with Drain Current and Gate Voltage.



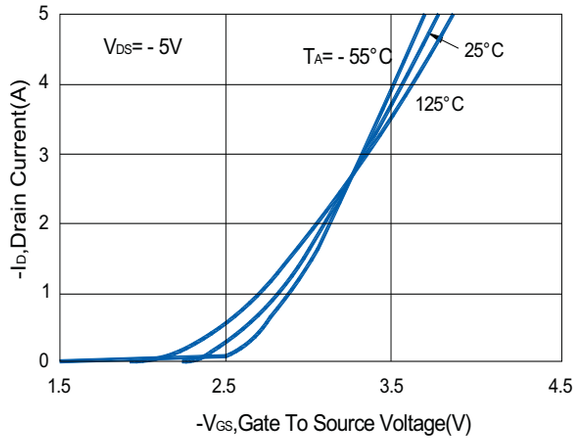
On-Resistance Variation with Temperature



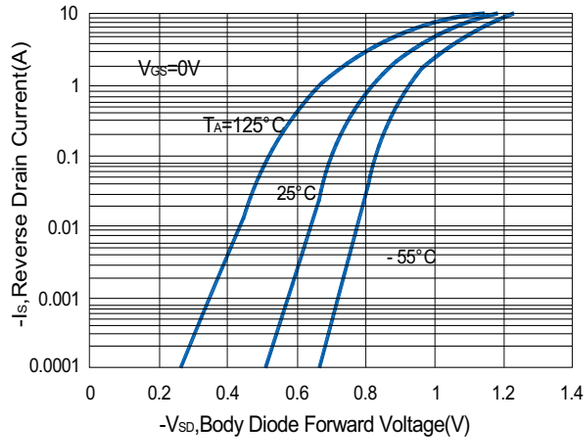
On-Resistance Variation with Gate-to-Source Voltage.



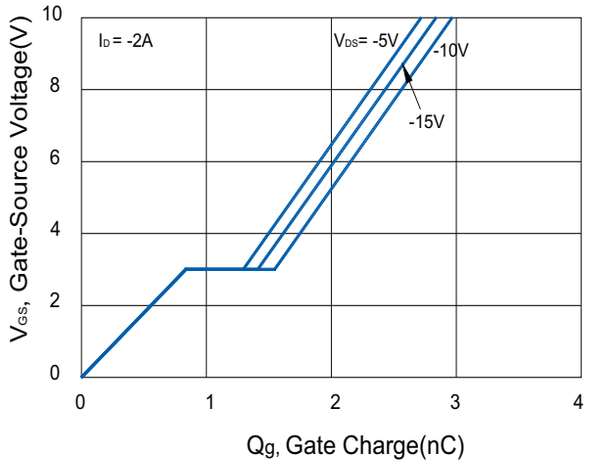
Transfer Characteristics



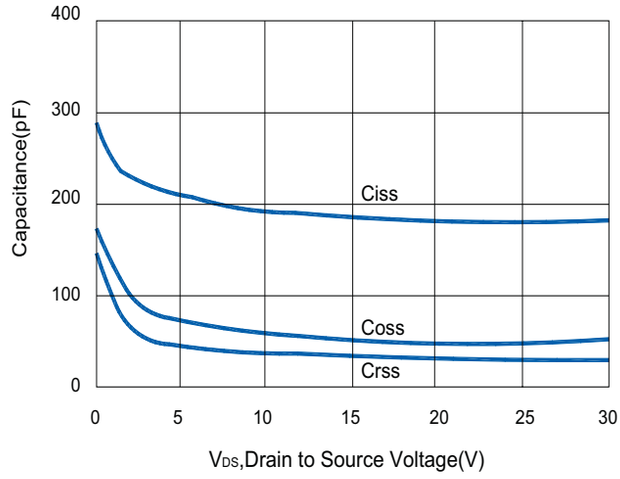
Body Diode Forward Voltage Variation With Source Current and Temperature.



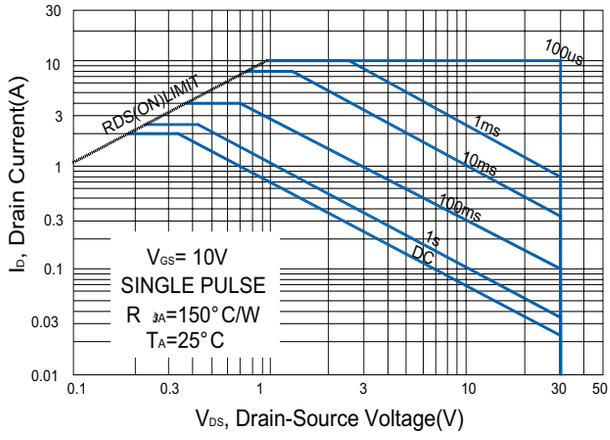
Gate-Charge Characteristics



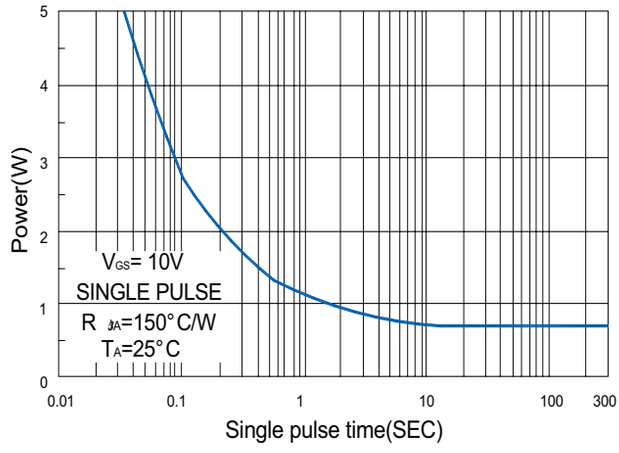
Capacitance Characteristics



Maximum Safe Operating Area.



Single Pulse Maximum Power Dissipation.



Transient Thermal Response Curve.