

复合沟道 MOSFET

ELM51016CA-S

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

■概要

ELM51016CA-S 是低输入电容、低工作电压、低导通电阻的大电流 MOSFET。同时内藏有 N 沟道和 P 沟道的复合产品。

■特点

- | N 沟道 | P 沟道 |
|---|---|
| • $V_{ds}=20V$ | • $V_{ds}=-20V$ |
| • $I_d=0.6A$ | • $I_d=-0.4A$ |
| • $R_{ds(on)} = 360m\Omega (V_{gs}=4.5V)$ | • $R_{ds(on)} = 620m\Omega (V_{gs}=-4.5V)$ |
| • $R_{ds(on)} = 420m\Omega (V_{gs}=2.5V)$ | • $R_{ds(on)} = 860m\Omega (V_{gs}=-2.5V)$ |
| • $R_{ds(on)} = 560m\Omega (V_{gs}=1.8V)$ | • $R_{ds(on)} = 1450m\Omega (V_{gs}=-1.8V)$ |

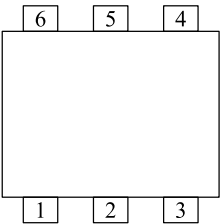
■绝对最大额定值

如没有特别注明时, $T_a=25^\circ C$

项目		记号	N 沟道 (最大值)	P 沟道 (最大值)	单位
漏极 - 源极电压		V_{ds}	20	-20	V
栅极 - 源极电压		V_{gs}	± 12	± 12	V
漏极电流 (定常) ($T_j=150^\circ C$)	$T_a=25^\circ C$	I_d	0.6	-0.4	A
	$T_a=70^\circ C$		0.4	-0.2	
漏极电流 (脉冲)		I_{dm}	1.0	-1.0	A
容许功耗	$T_c=25^\circ C$	P_d	0.27	0.27	W
	$T_c=70^\circ C$		0.16	0.16	
结合部温度		T_j	-55 ~ 150	-55 ~ 150	$^\circ C$
保存温度范围		T_{stg}	-55 ~ 150	-55 ~ 150	$^\circ C$

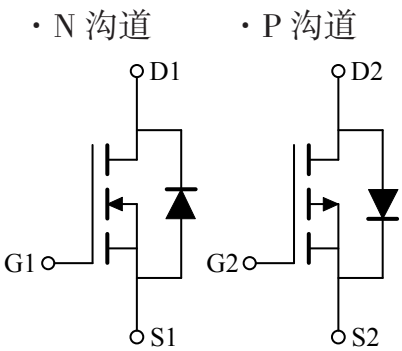
■引脚配置图

SOT-563(俯视图)



引脚编号	引脚名称
1	SOURCE1
2	GATE1
3	DRAIN2
4	SOURCE2
5	GATE2
6	DRAIN1

■电路图



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■电特性 (N 沟道)

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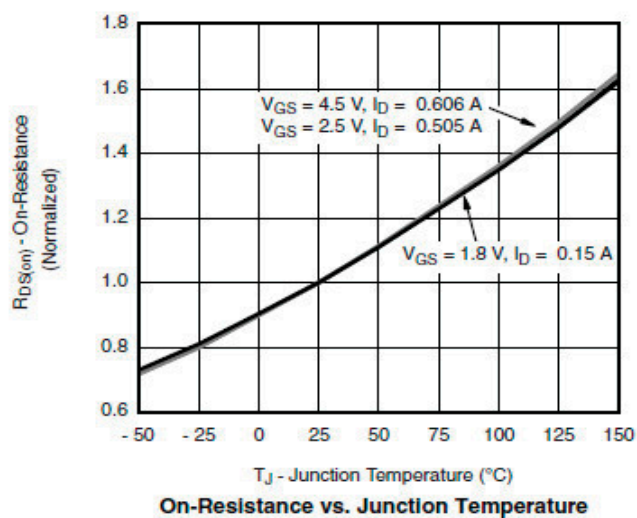
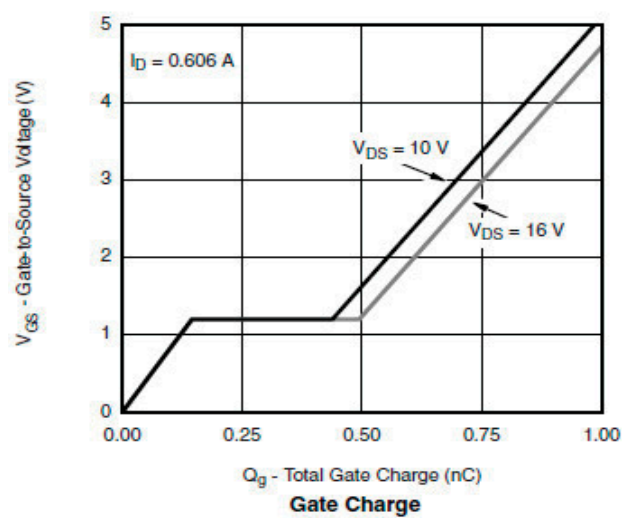
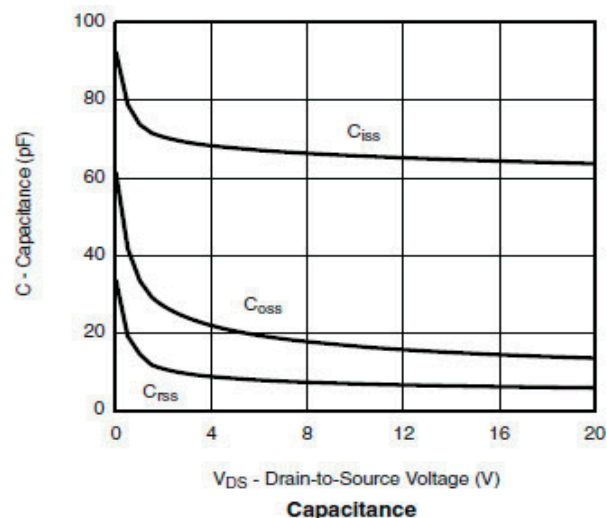
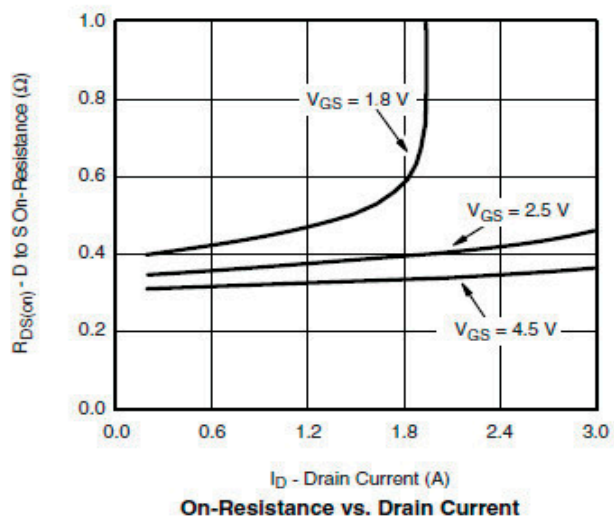
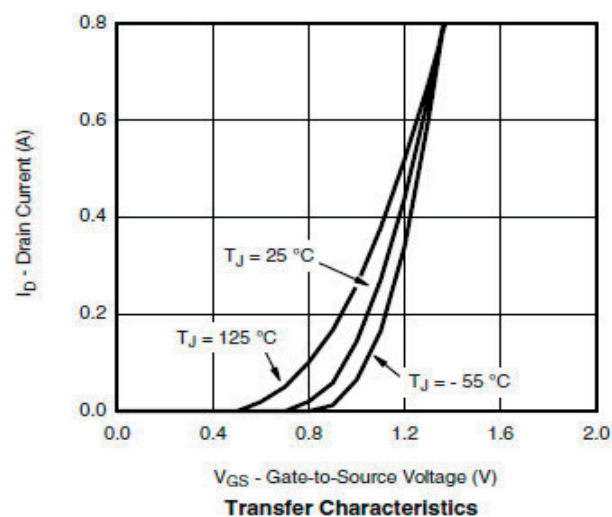
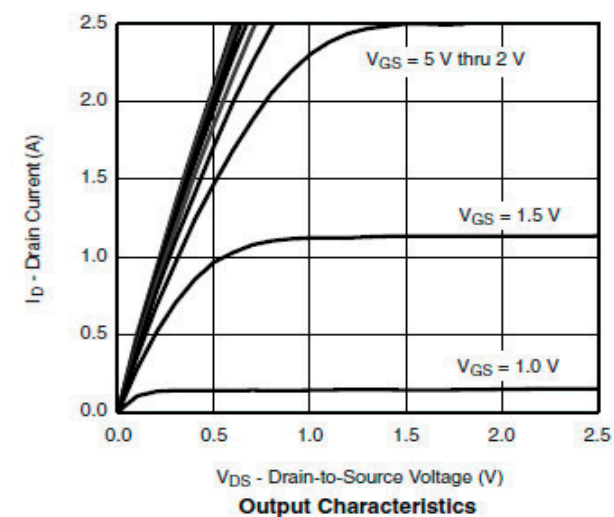
项目	记号	条件	最小值	典型值	最大值	单位
静态特性						
漏极 – 源极击穿电压	BV _{dss}	Id=250μA, Vgs=0V	20			V
栅极接地时漏极电流	Idss	Vds=20V, Vgs=0V			1	μA
		Ta=85℃			5	
栅极漏电电流	Igss	Vds=0V, Vgs= ± 12V			± 100	nA
栅极阈值电压	Vgs(th)	Vds=Vgs, Id=250μA	0.4		1.0	V
导通时漏极电流	Id(on)	Vgs=4.5V, Vds≥5V	0.7			A
漏极 – 源极导通电阻	Rds(on)	Vgs=4.5V, Id=0.6A		240	360	mΩ
		Vgs=2.5V, Id=0.5A		300	420	
		Vgs=1.8V, Id=0.4A		420	560	
正向跨导	Gfs	Vds=10V, Id=0.4A		1		S
二极管正向压降	Vsd	Is=0.15A, Vgs=0V		0.8	1.2	V
寄生二极管最大连续电流	Is				0.3	A
动态特性						
输入电容	Ciss	Vgs=0V, Vds=10V, f=1MHz		70		pF
输出电容	Coss			20		pF
反馈电容	Crss			8		pF
开关特性						
总栅极电荷	Qg	Vgs=4.5V, Vds=10V, Id≡0.6A		1.06	1.38	nC
栅极 – 源极电荷	Qgs			0.18		nC
栅极 – 漏极电荷	Qgd			0.32		nC
导通延迟时间	td(on)	Vgs=4.5V, Vds=10V, Id≡0.5A RL=20Ω, Rgen=1Ω		18	26	ns
导通上升时间	tr			20	28	ns
关闭延迟时间	td(off)			70	110	ns
关闭下降时间	tf			25	40	ns

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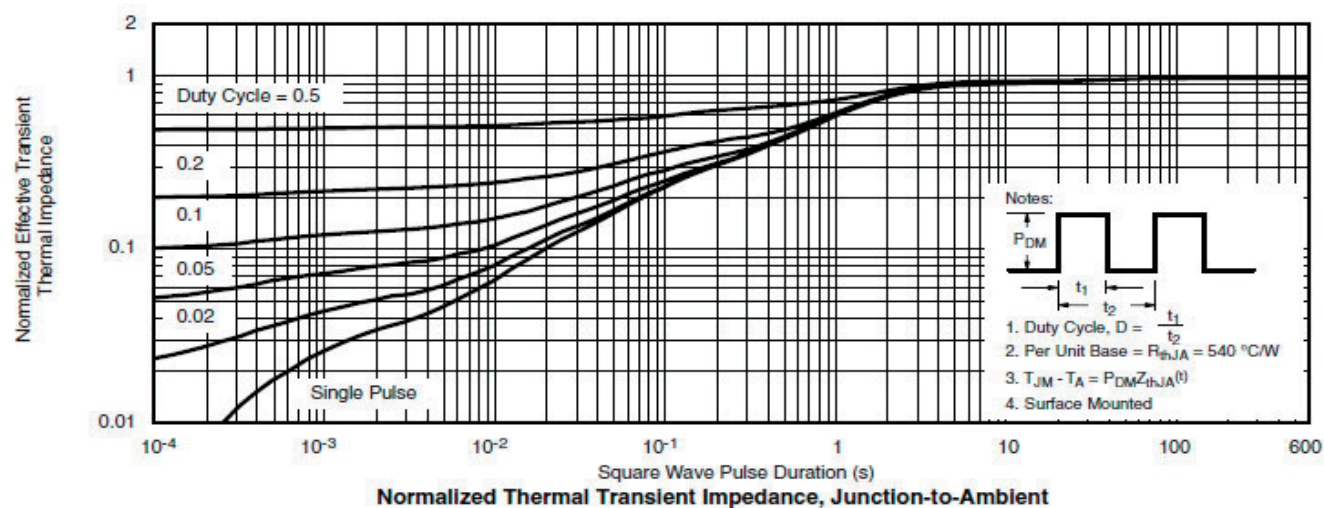
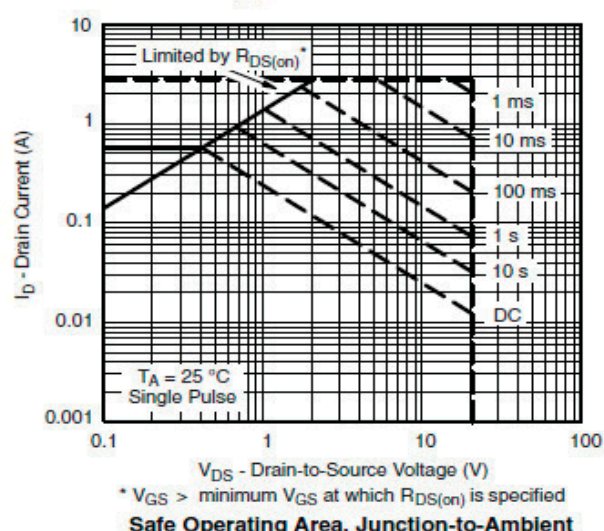
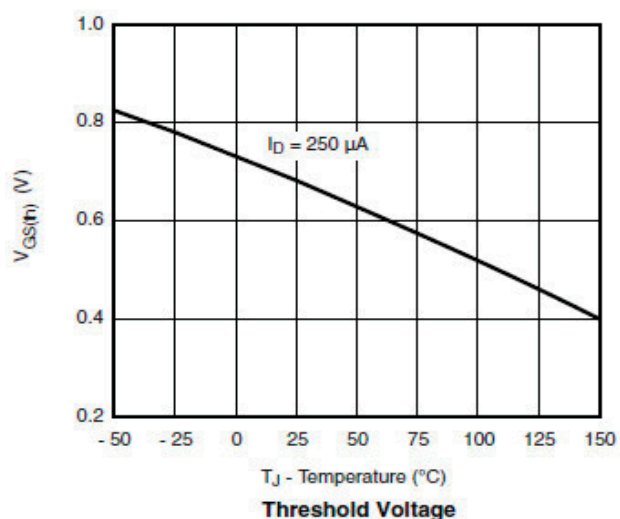
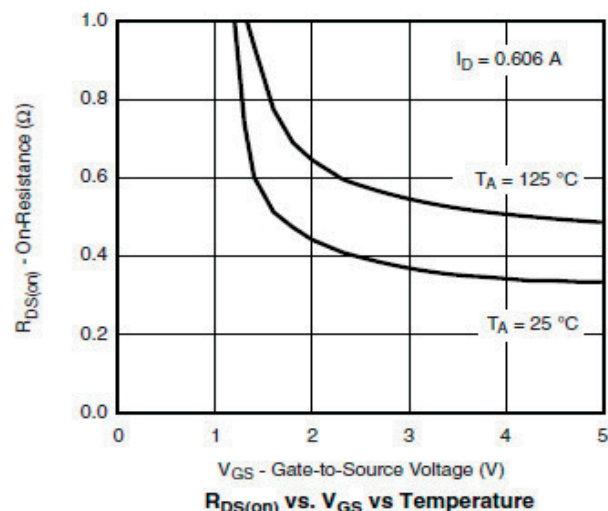
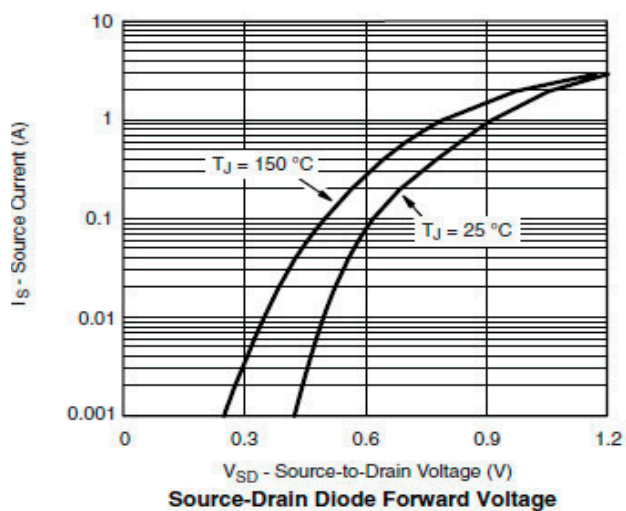
■标准特性曲线 (N 沟道)



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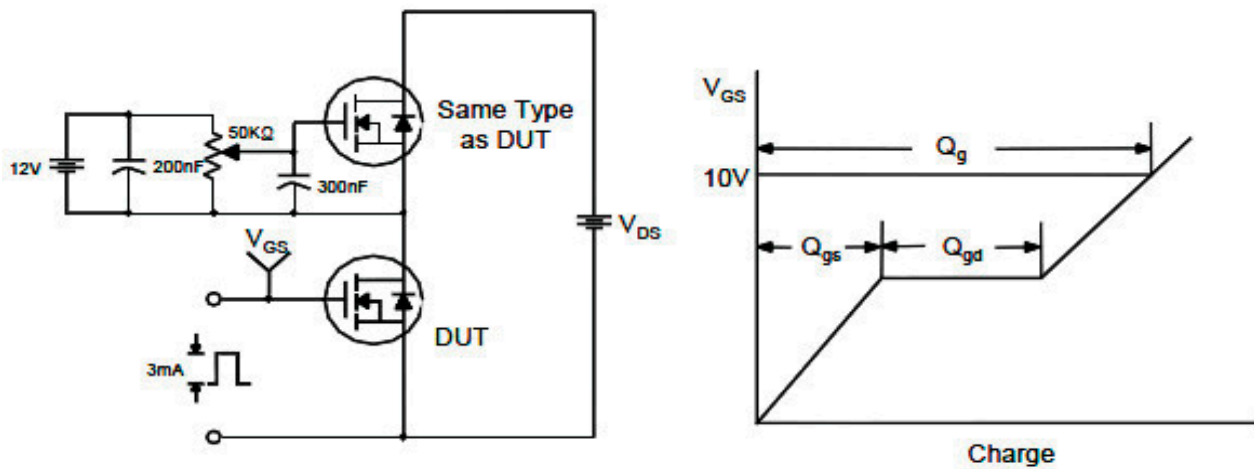
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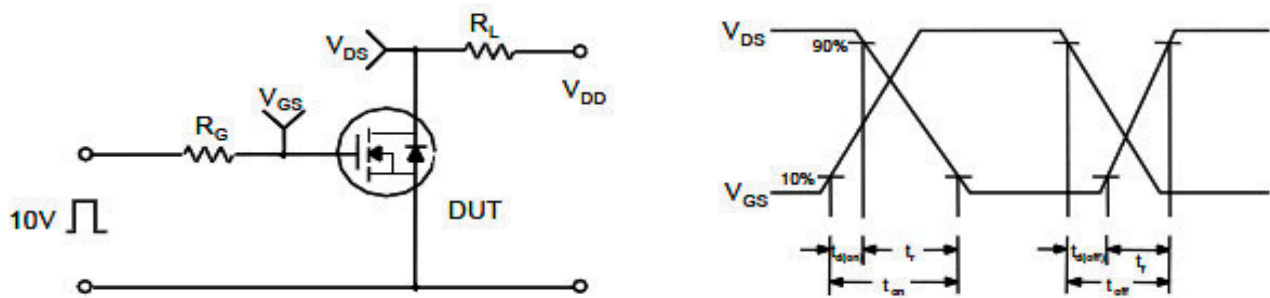
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■测试电路和波形 (N 沟道)

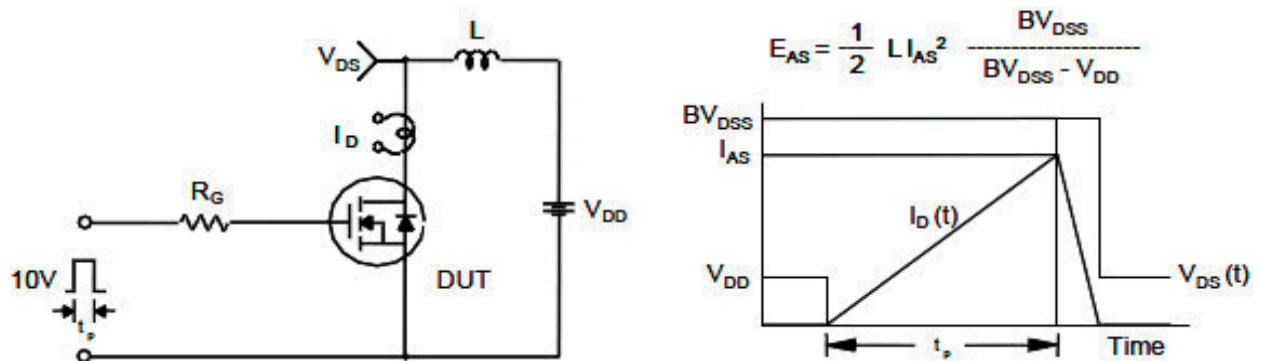
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



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■电特性 (P 沟道)

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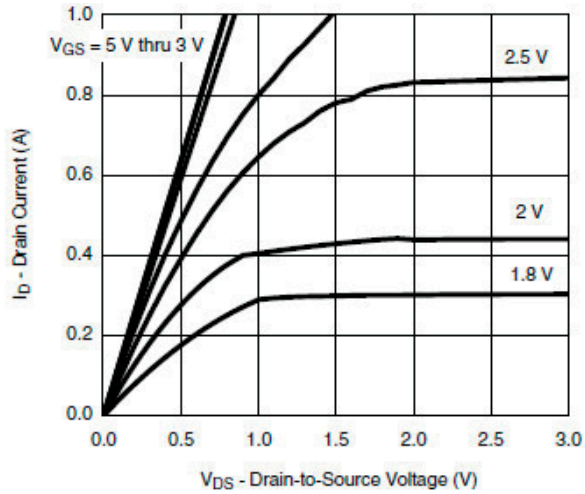
项目	记号	条件	最小值	典型值	最大值	单位	
静态特性							
漏极 – 源极击穿电压	BV _{dss}	Id=−250μA, Vgs=0V		−20		V	
栅极接地时漏极电流	Idss	Vds=−20V, Vgs=0V			−1	μA	
		Ta=85℃			−5		
栅极漏电电流	Igss	Vds=0V, Vgs= ± 12V			± 100	nA	
栅极阈值电压	Vgs(th)	Vds=Vgs, Id=−250μA		−0.4	−1.0	V	
导通时漏极电流	Id(on)	Vgs=−4.5V, Vds≥−5V		−0.7		A	
漏极 – 源极导通电阻	Rds(on)	Vgs=−4.5V, Id=−0.4A			500	620	mΩ
		Vgs=−2.5V, Id=−0.3A			700	860	
		Vgs=−1.8V, Id=−0.2A			1000	1450	
正向跨导	Gfs	Vds=−10V, Id=−0.4A			1	S	
二极管正向压降	Vsd	Is=−0.15A, Vgs=0V			−0.65	−1.20	V
寄生二极管最大连续电流	Is					−0.3	A
动态特性							
输入电容	Ciss	Vgs=0V, Vds=−10V, f=1MHz			70	100	pF
输出电容	Coss				20		pF
反馈电容	Crss				10		pF
开关特性							
总栅极电荷	Qg	Vgs=−4.5V, Vds=−10V Id≡−0.25A			1.0	1.3	nC
栅极 – 源极电荷	Qgs				0.1		nC
栅极 – 漏极电荷	Qgd				0.3		nC
导通延迟时间	td(on)	Vgs=−4.5V, Vds=−10V Id≡−0.2A, RL=30Ω Rgen=10Ω			10	15	ns
导通上升时间	tr				10	15	ns
关闭延迟时间	td(off)				40	60	ns
关闭下降时间	tf				30	50	ns

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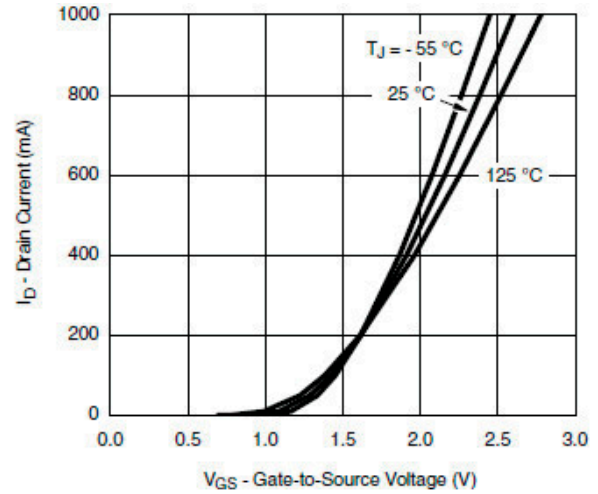
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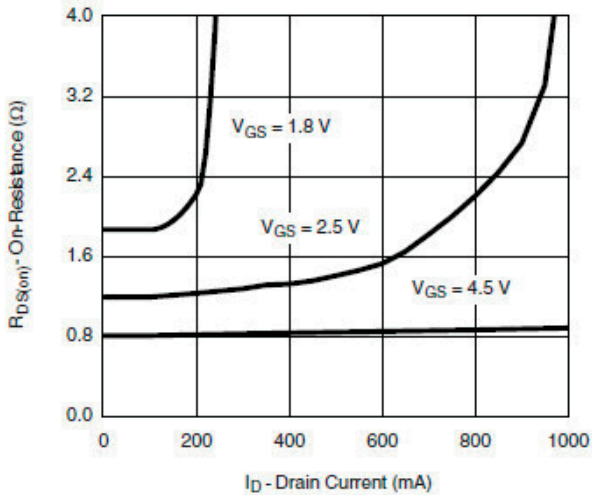
■标准特性曲线 (P 沟道)



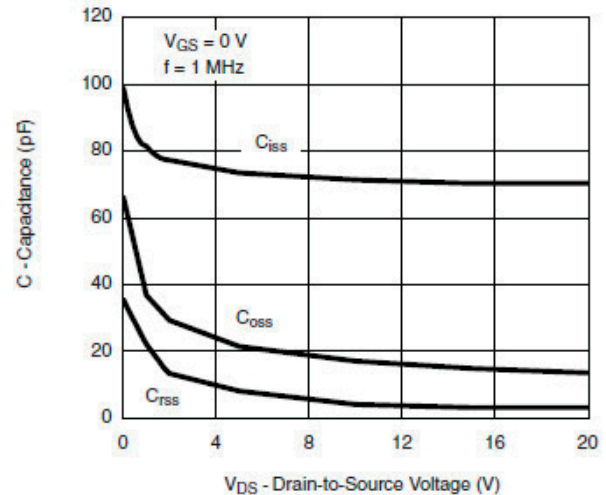
Output Characteristics



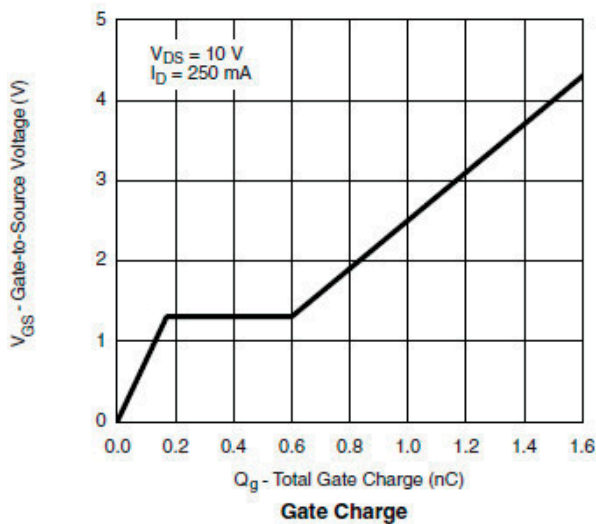
Transfer Characteristics



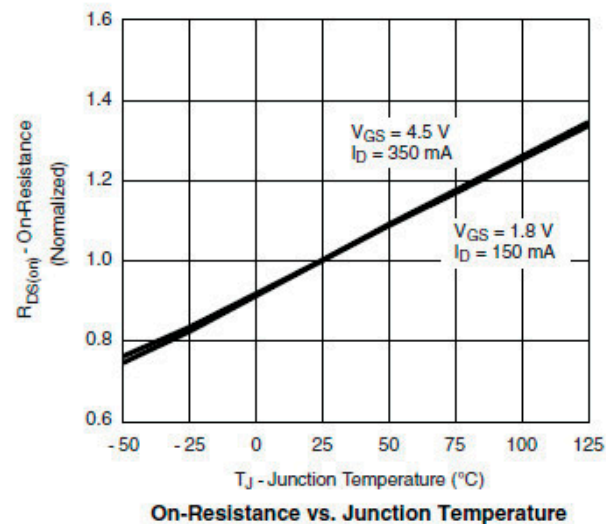
On-Resistance vs. Drain Current



Capacitance



Gate Charge

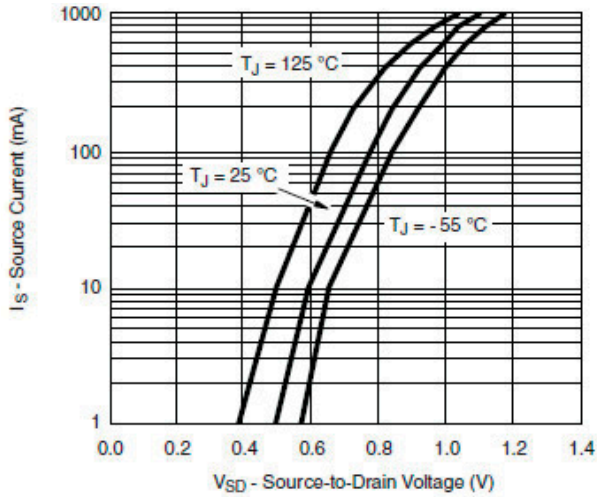


On-Resistance vs. Junction Temperature

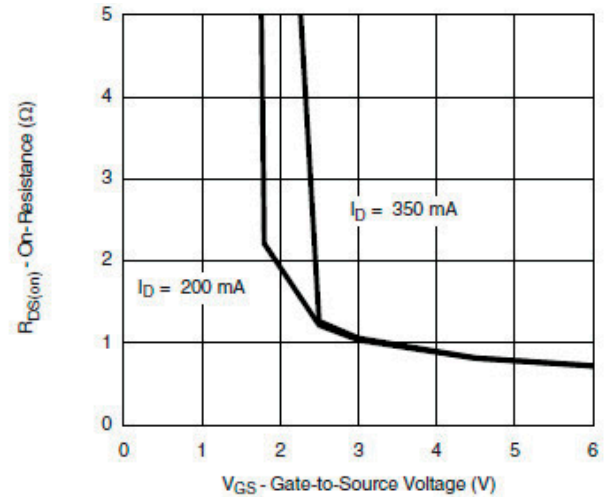
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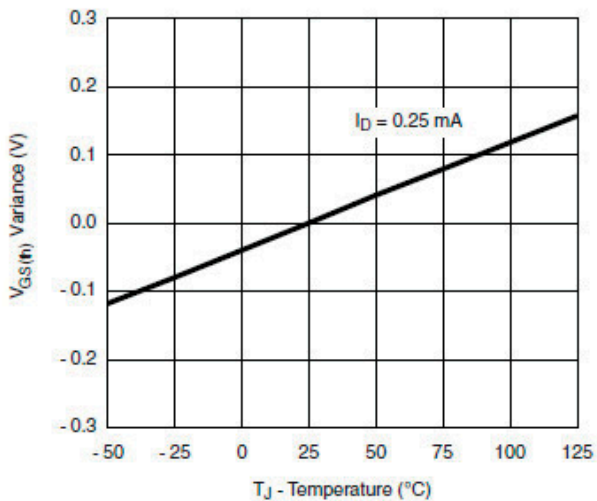
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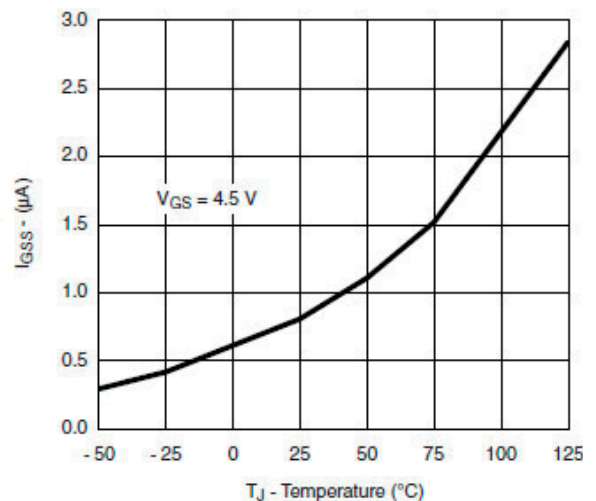
Source-Drain Diode Forward Voltage



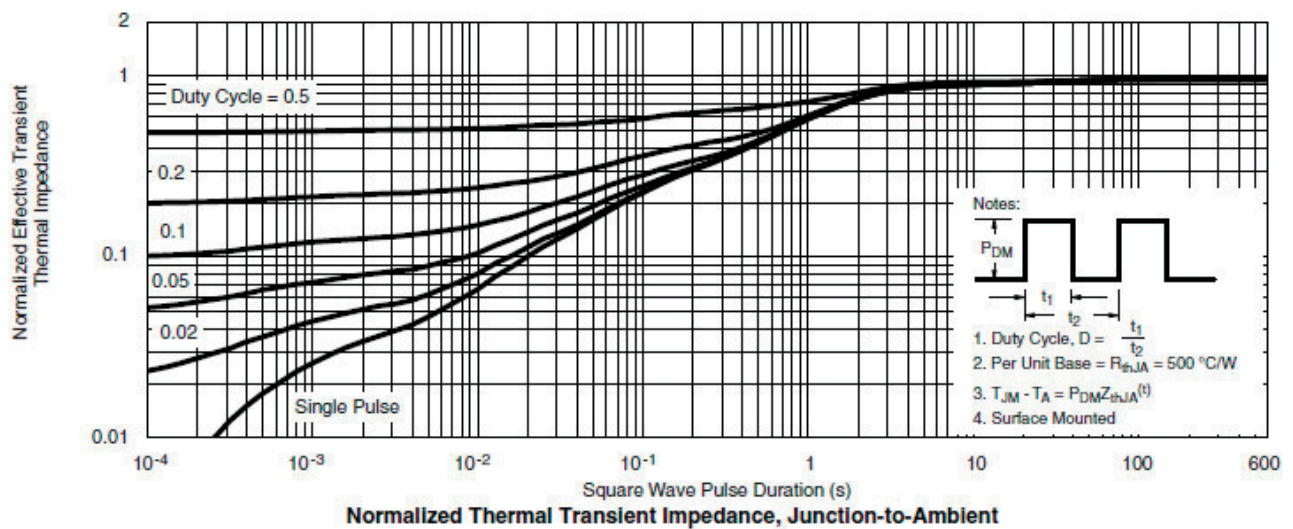
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature



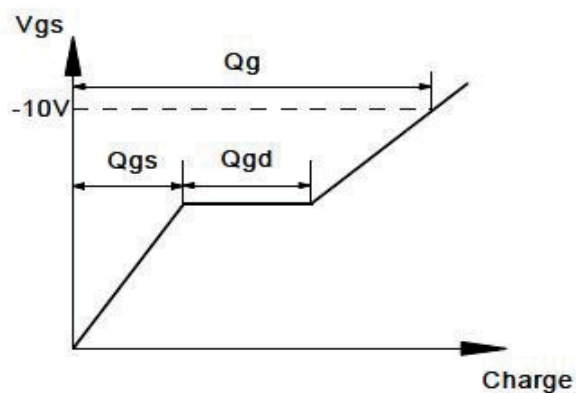
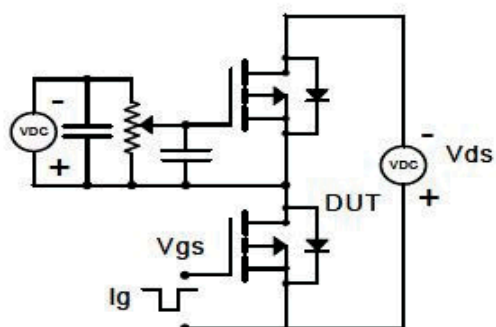
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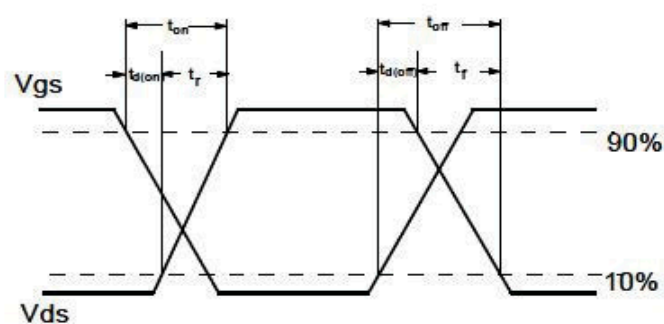
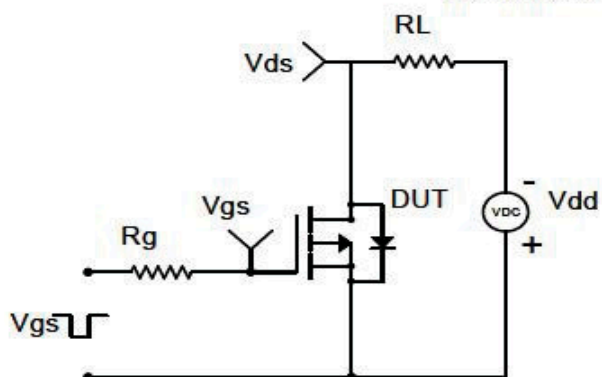
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■测试电路和波形 (P 沟道)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

