关键参数 Key Parameters

V_{DSmax}		1200	V
$R_{DS(on)}$	Typ.	77	mΩ
I_D	Max.	30	A
Die Size		2.54 × 2.54	mm^2

特点 Features

- 高开关频率 High Switching Frequency
- 低开关损耗 Low Switching Loss
- 软、快速开关 Soft, fast Switching
- 易并联使用 Easy Paralleling

电路结构 Circuit Configuration

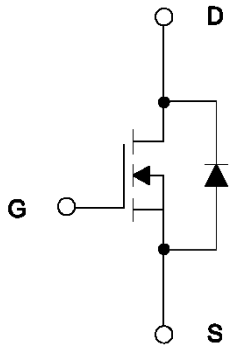


图 1. 电路结构

Fig. 1 Circuit configuration

最大额定值 Maximum Ratings

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions	数值 Value	单位 Unit
V_{DSmax}	漏源极电压 Drain-source voltage		1200	V
V_{GSS}	栅源电压 Gate-source voltage		-8/+23	V
V_{GSop}	栅源电压 Gate-source voltage		-4/+18	V
I_D	持续正向电流, 由 $T_{vj\,max}$ 限制 Continuous forward current, limited by $T_{vj\,max}$		30	A
I_{DM}	最大重复正向电流, 由 $T_{vj\,max}$ 限制 Maximum repetitive forward current, limited by $T_{vj\,max}$		60	A
$T_{vj\,max}$	最大允许结温 Max. Junction temperature		175	°C
$T_{vj(op)}$	工作结温 Operation junction temperature		-40...+175	°C
T_{Proc}(*1)	最大加工温度 Maximum processing temperature		400	°C

电特性值 Electrical Characteristics

除非特别声明，否则 T_{vj}= 25 °C　　T_{vj}= 25 °C unless otherwise stated

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
I_{DSS}	零栅压漏极电流 Zero gate voltage drain current	V_{GS} = 0V, V_{DS} = V_{DSS}			20	μA
		V_{GS} = 0V, V_{DS} = V_{DSS}, T_{vj} = 175 °C			20	μA
I_{GSS}	栅极漏电流 Gate leakage current	V_{GS} = V_{GSS}, V_{DS} = 0V			250	nA
$V_{GS(th)}$ (*2)	栅极-源极阈值电压 Gate threshold voltage	I_D = 10 mA, V_{GS} = V_{DS}	2.1	3.3		V
		I_D = 10 mA, V_{GS} = V_{DS}, T_{vj} = 175 °C	1.4	2.0		V
$R_{DS(on)}$	漏极-源极通态电阻 Drain-source on-state resistance	V_{GS} =18V, I_D = 16A		77	90	mΩ
		V_{GS} =18V, I_D = 16A, T_{vj} = 175 °C		124		mΩ
		V_{GS} =15V, I_D = 16A		100		mΩ
		V_{GS} =15V, I_D = 16A, T_{vj} = 175 °C		133		mΩ
g_{fs}	跨导 Forward transconductance	V_{DS} =20V, I_D = 16A		8.7		S
C_{iss}	输入电容 Input capacitance	V_{DS} = 1000V, V_{GS} = 0V, f = 100kHz, V_{AC} = 30mV		989		pF
C_{oss}	输出电容 Output capacitance			295		pF
C_{rss}	反向传输电容 Reverse transfer capacitance			11		pF
E_{oss}	电容存储能量 C_{oss} Stored Energy			44		μJ
R_{Gint}	内部栅极电阻 Internal gate resistor	V_{GS} =0V		8		Ω
Q_{gs}	栅源电荷 Gate to source charge	V_{DS} = 800V, V_{GS} = -4/18V, I_D = 16A		4.3		nC
Q_{gd}	栅漏电荷 Gate to drain charge			80.8		nC
Q_g	总栅极电荷 Total gate charge			37.5		nC
V_{SD}	二极管正向电压 Diode forward voltage	I_{SD} =16A, V_{GS} = -4V		5.2		V
		I_{SD} =16A, V_{GS} = -4V, T_{vj} = 175 °C		4.8		V

注意： 1.(*1) 表示最长持续时间 10min((*1)) indicates 10min, maximum);

Note: 2.(*2) 表示做过预处理后的测试值((*2) indicates $V_{GS(th)}$ is preprocessed);

电特性值 Electrical Characteristics

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions		最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
$t_{d(off)}$	关断延迟时间 Turn-off delay time	I_D =30A, V_{DS} = 800V, V_{GS} = -4/+15V, $R_{G(OFF)}$ =0.5Ω, dv/dt =54840V/μs (T_{vj}= 175 °C)	T_{vj}= 25 °C		33		ns
			T_{vj}= 175 °C		48		
t_f	下降时间 Fall time		T_{vj}= 25 °C		16		ns
			T_{vj}= 175 °C		15		
E_{OFF}	关断损耗 Turn-off energy loss		T_{vj}= 25 °C		530		uJ
			T_{vj}= 175 °C		661		
$t_{d(on)}$	开通延迟时间 Turn-on delay time	I_D =30A, V_{DS} = 800V, V_{GS} = -4/+15V, $R_{G(ON)}$ =4.3Ω, di/dt =2000A/μs (T_{vj}= 175 °C)	T_{vj}= 25 °C		13		ns
			T_{vj}= 175 °C		14		
t_r	上升时间 Rise time		T_{vj}= 25 °C		101		ns
			T_{vj}= 175 °C		30		
E_{ON}	开通损耗 Turn-on energy loss		T_{vj}= 25 °C		150		uJ
			T_{vj}= 175 °C		290		
Q_{rr}	二极管反向恢复电荷 Diode reverse recovery charge	I_D =30A, V_{DS} = 800V, - di_{SD}/dt = 2000A/μs (T_{vj}= 175 °C)	T_{vj}= 25 °C		1000		nC
			T_{vj}= 175 °C		1000		
I_{rr}	二极管反向恢复电流 Diode reverse recovery current		T_{vj}= 25 °C		11		A
			T_{vj}= 175 °C		54		

电特性值 Electrical Characteristics

符号 Symbol	参数名称 Parameter	测试条件 Test Conditions		最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
$t_{d(off)}$	关断延迟时间 Turn-off delay time	I_D =30A, V_{DS} = 800V, V_{GS} = -4/+18V, $R_{G(OFF)}$ =1.5Ω, dv/dt =72360V/μs (T_{vj}= 175 °C)	T_{vj}= 25 °C		47		ns
			T_{vj}= 175 °C		41		
t_f	下降时间 Fall time		T_{vj}= 25 °C		13		ns
			T_{vj}= 175 °C		16		
E_{OFF}	关断损耗 Turn-off energy loss		T_{vj}= 25 °C		560		μJ
			T_{vj}= 175 °C		660		
$t_{d(on)}$	开通延迟时间 Turn-on delay time	I_D =30A, V_{DS} = 800V, V_{GS} = -4/+18V, $R_{G(ON)}$ =3.3Ω, di/dt =1900A/μs (T_{vj}= 175 °C)	T_{vj}= 25 °C		90		ns
			T_{vj}= 175 °C		27		
t_r	上升时间 Rise time		T_{vj}= 25 °C		29		ns
			T_{vj}= 175 °C		5		
E_{ON}	开通损耗 Turn-on energy loss		T_{vj}= 25 °C		200		μJ
			T_{vj}= 175 °C		273		
Q_{rr}	二极管反向恢复电荷 Diode reverse recovery charge	I_D =30A, V_{DS} = 800V, - di_{SD}/dt = 1900A/μs (T_{vj}= 175 °C)	T_{vj}= 25 °C		1000		nC
			T_{vj}= 175 °C		1000		
I_{rr}	二极管反向恢复电流 Diode reverse recovery current		T_{vj}= 25 °C		13		A

注意：
Note:

1.(*1) dv/dt：定义为关断波形电压 V_{CE} 上升段，40% V_{CE} 至 60% V_{CE} 区间段的斜率((*1) dv/dt：Defined as the slope of waveform of 40% V_{CE} to 60% V_{CE} during turn off)

2.(*2) di/dt：定义为开通波形电流I_C上升段，40% I_C至60%I_C区间段的斜率((*2) di/dt：Defined as the slope of waveform of 40% V_{CE} to 60% di/dt during turn on)

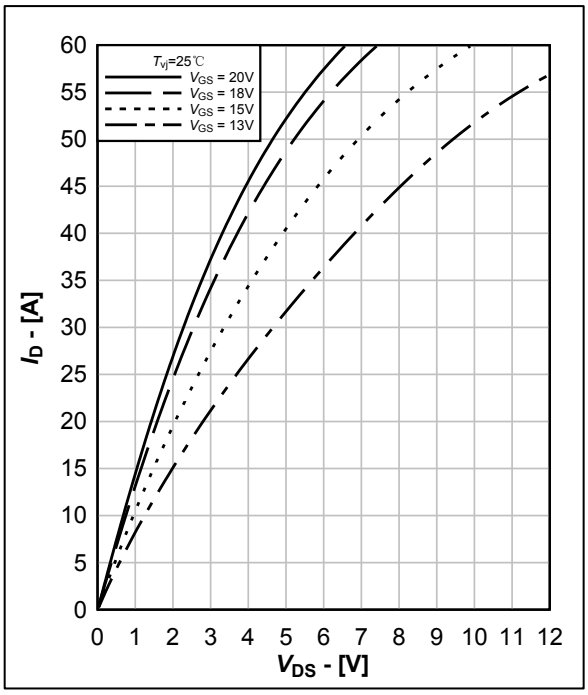


图2. 输出特性典型曲线, I_D= f (V_{DS}), T_{vj} = 25 °C
Fig.2 Typical output characteristics, I_D= f (V_{DS}), T_{vj} = 25 °C

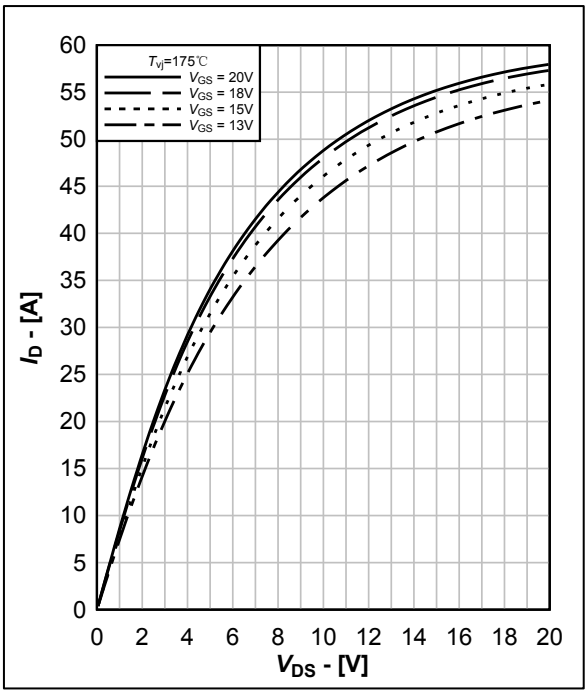


图3. 输出特性典型曲线, I_D= f (V_{DS}), T_{vj} = 175 °C
Fig.3 Typical output characteristics, I_D= f (V_{DS}), T_{vj} = 175 °C

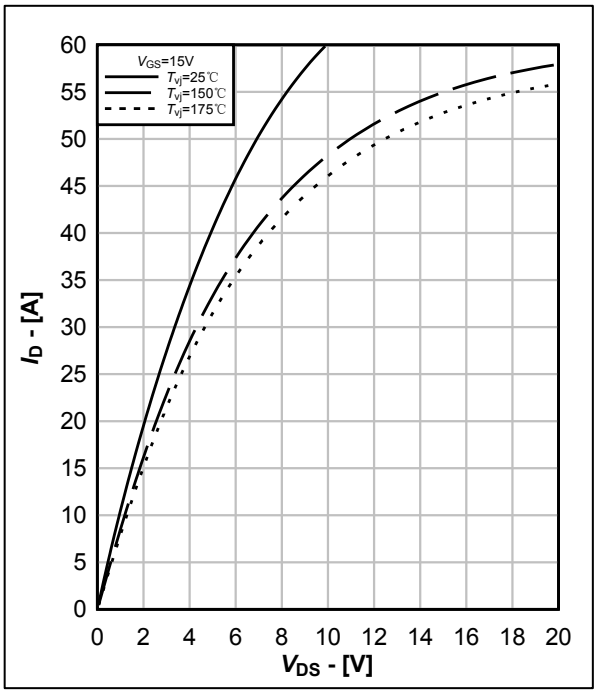


图4. 输出特性典型曲线, I_D= f (V_{DS})
Fig.4 Typical output characteristics, I_D= f (V_{DS})

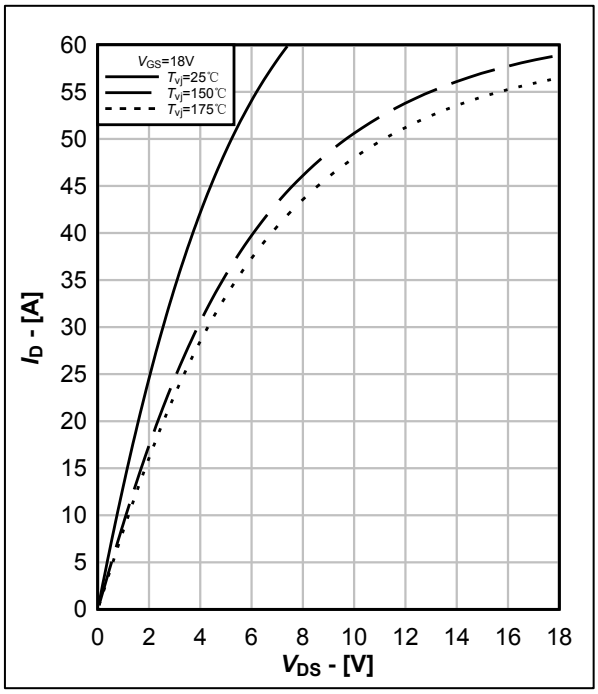


图5. 输出特性典型曲线, I_D= f (V_{DS})
Fig.5 Typical output characteristics, I_D= f (V_{DS})

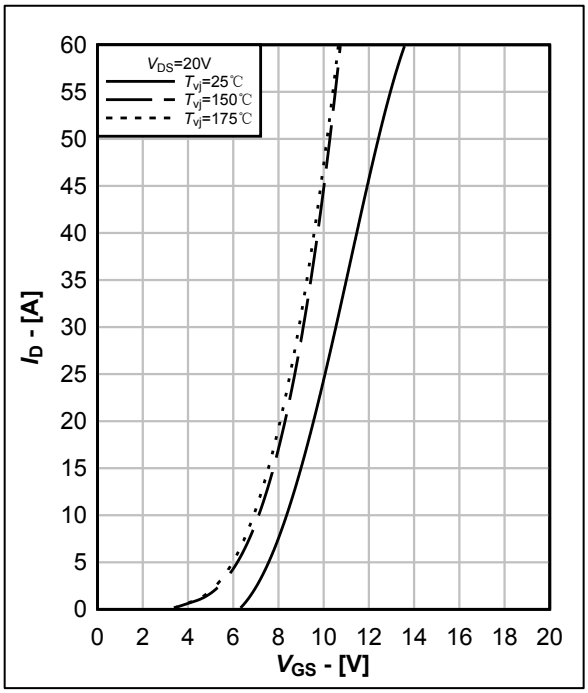


图6.传输特性典型曲线,I_D= f (V_{GS})
Fig.6 Typical transfer characteristics, I_D= f (V_{GS})

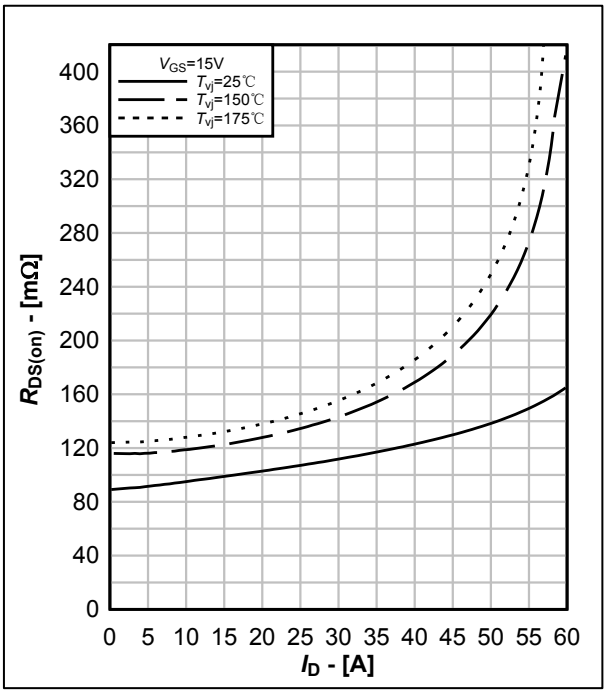


图7. 导通电阻典型曲线, $R_{DS(on)}$ = f (I_D)
Fig.7 Typical On-Resistance characteristics, $R_{DS(on)}$ = f (I_D)

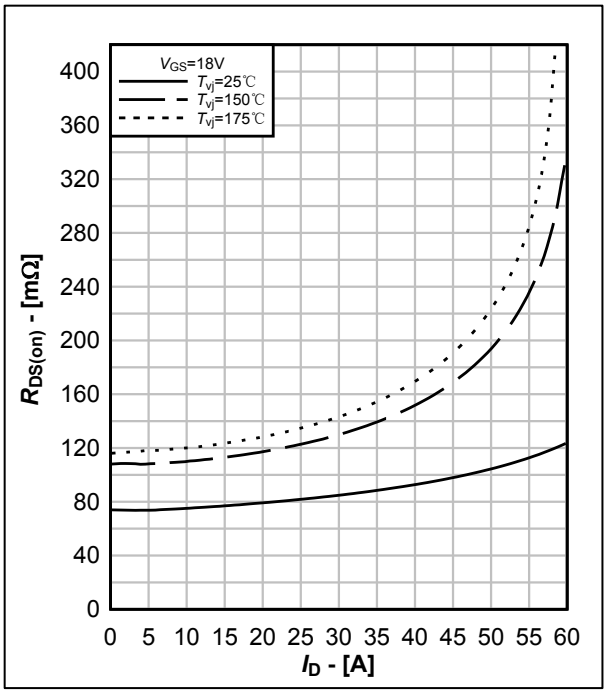


图8. 导通电阻典型曲线, $R_{DS(on)}$ = f (I_D)
Fig.8 Typical On-Resistance characteristics, $R_{DS(on)}$ = f (I_D)

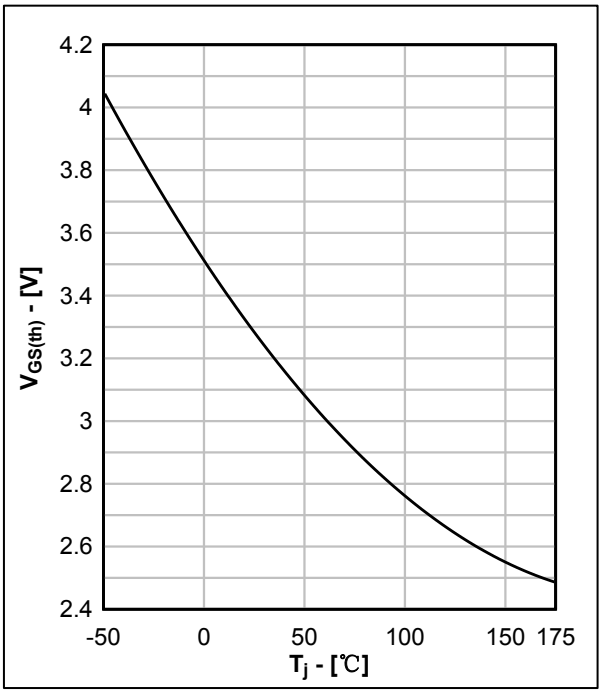


图9. 阈值电压典型曲线, $V_{GS(th)}$ = f (T_j)
Fig.9 Typical $V_{GS(th)}$ characteristics, $V_{GS(th)}$ = f (T_j)

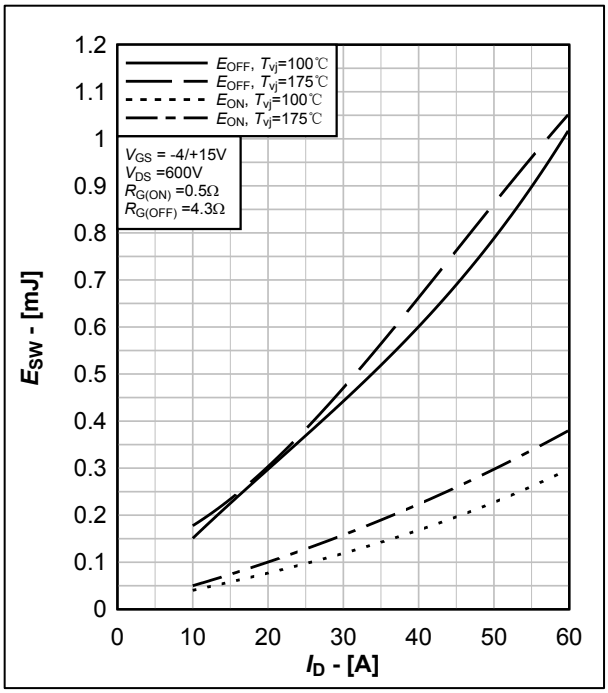


图10. MOSFET开关损耗典型曲线, E_{off}= f (I_D), E_{on}= f (I_D)
Fig.10 Typical MOSFET switching energy, E_{off}= f (I_D), E_{on}= f (I_D)

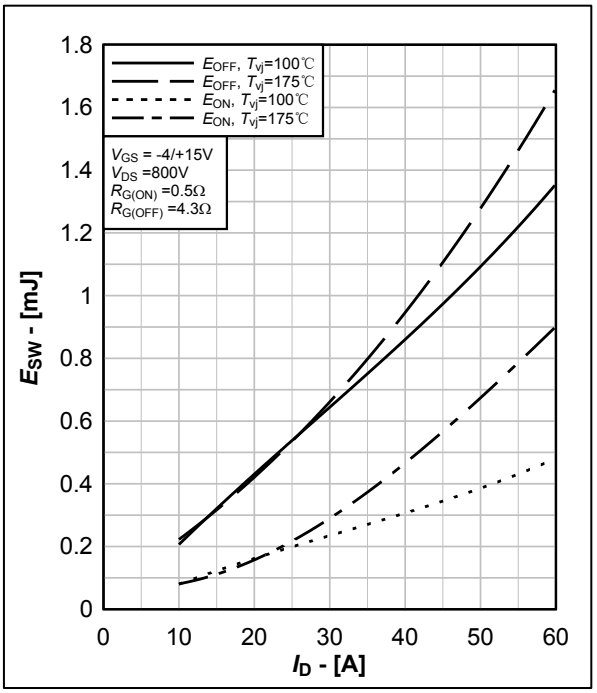


图11. MOSFET开关损耗典型曲线, E_{off}= f (I_D), E_{on}= f (I_D)
Fig.11 Typical MOSFET switching energy, E_{off}= f (I_D), E_{on}= f (I_D)

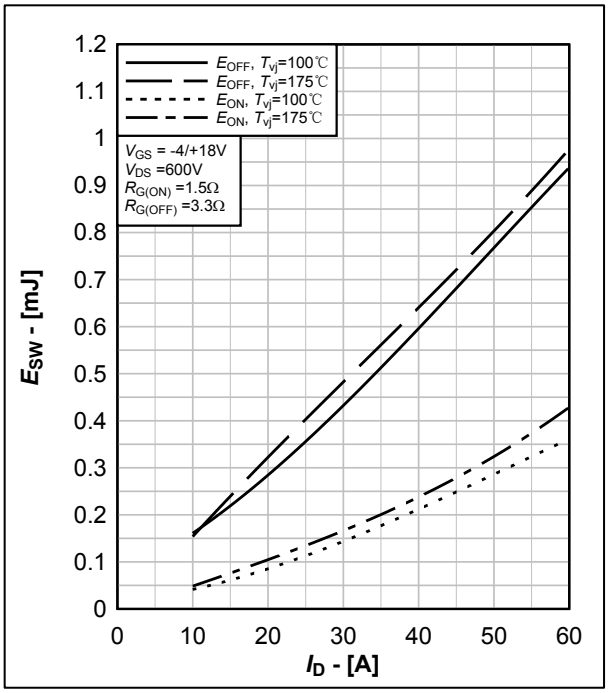


图12. MOSFET开关损耗典型曲线, E_{off}= f (I_D), E_{on}= f (I_D)
Fig.12 Typical MOSFET switching energy, E_{off}= f (I_D), E_{on}= f (I_D)

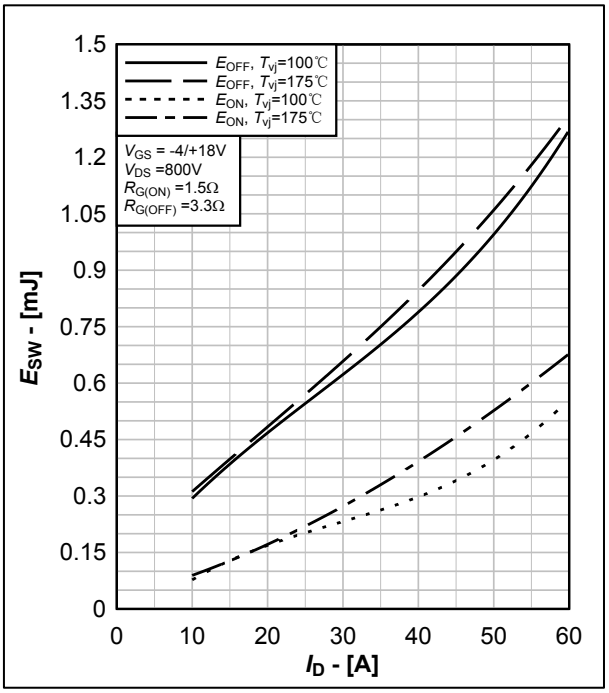


图13. MOSFET开关损耗典型曲线, E_{off}= f (I_D), E_{on}= f (I_D)
Fig.13 Typical MOSFET switching energy, E_{off}= f (I_D), E_{on}= f (I_D)

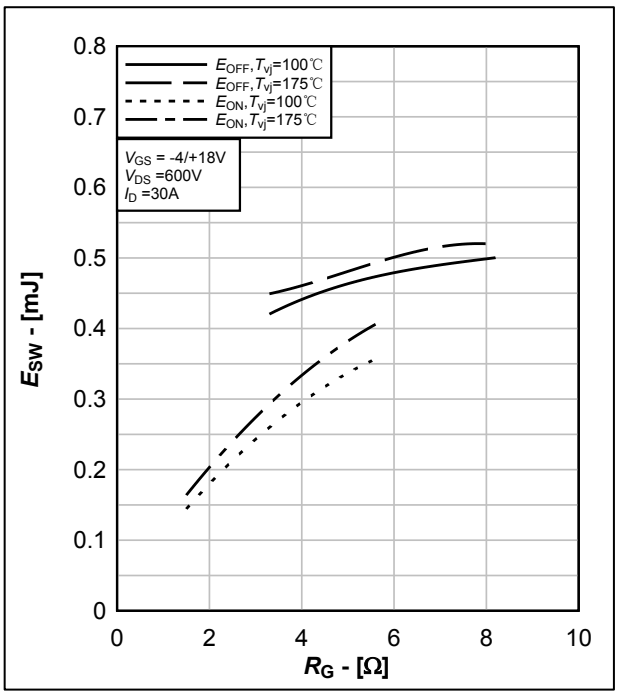


图14. MOSFET开关损耗典型曲线, E_{on}= f (R_G), E_{off}= f (R_G)
Fig.14 Typical MOSFET switching energy, E_{on}= f(R_G), E_{off}= f (R_G)

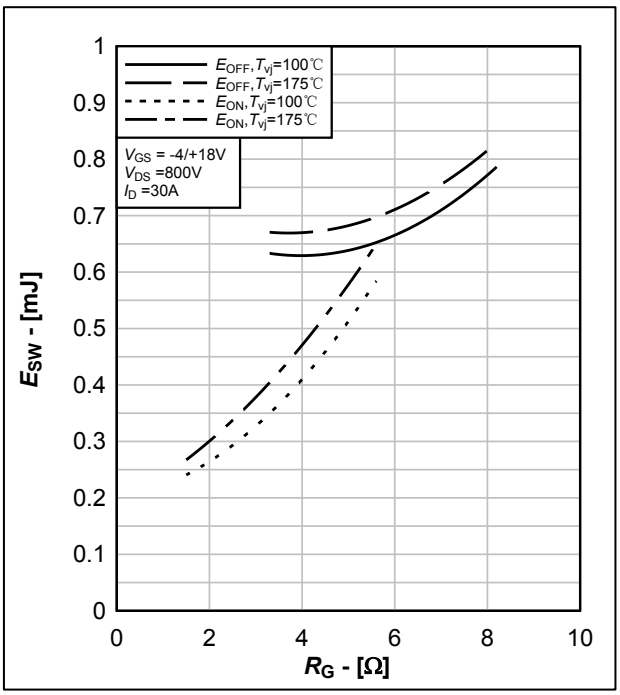


图15. MOSFET开关损耗典型曲线, E_{on}= f (R_G), E_{off}= f (R_G)
Fig.15 Typical MOSFET switching energy, E_{on}= f(R_G), E_{off}= f (R_G)

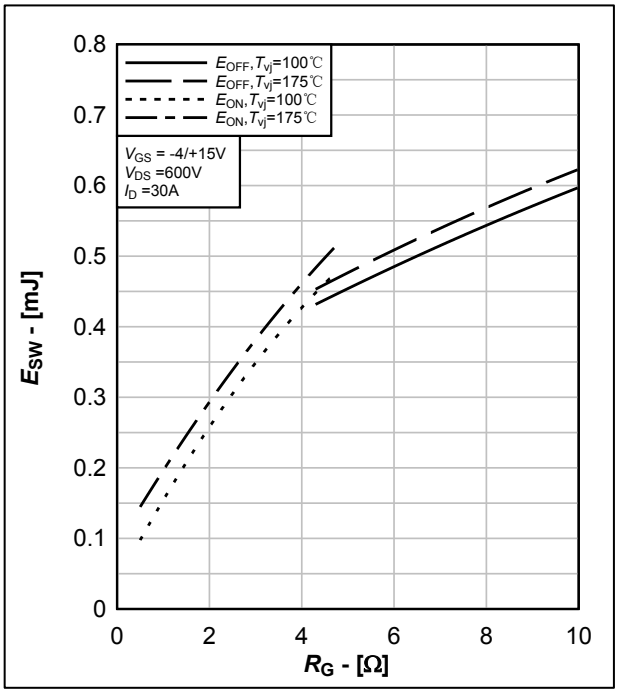


图16. MOSFET开关损耗典型曲线, E_{on}= f (R_G), E_{off}= f (R_G)
Fig.16 Typical MOSFET switching energy, E_{on}= f(R_G), E_{off}= f (R_G)

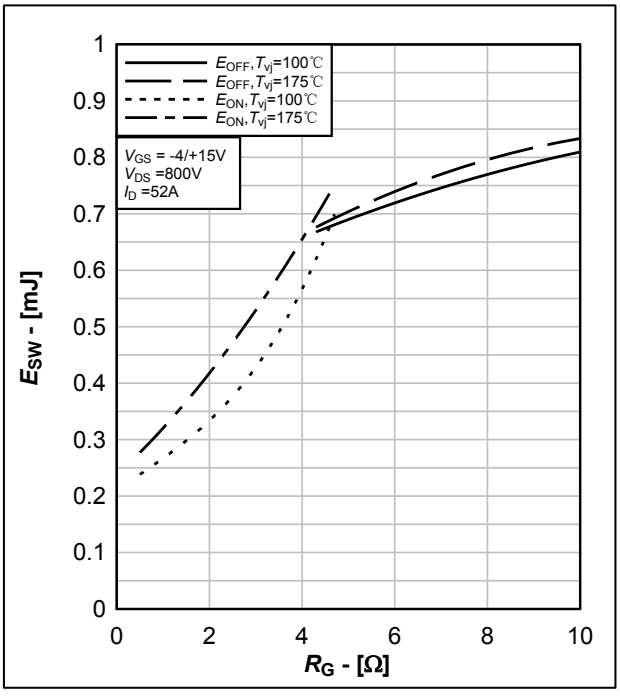


图17. MOSFET开关损耗典型曲线, E_{on}= f (R_G), E_{off}= f (R_G)
Fig.17 Typical MOSFET switching energy, E_{on}= f(R_G), E_{off}= f (R_G)

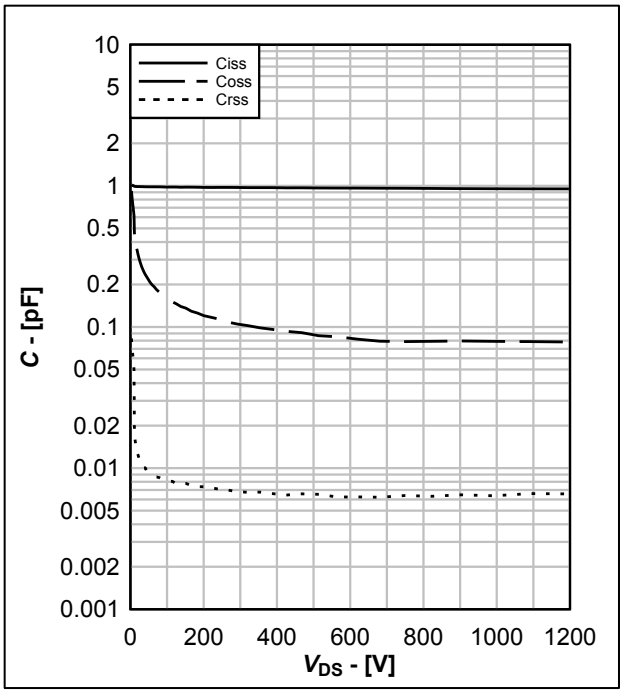


图18. 电容特性典型曲线, C= f (V_{DS})
Fig.18 Typical capacity characteristic, C= f (V_{DS})

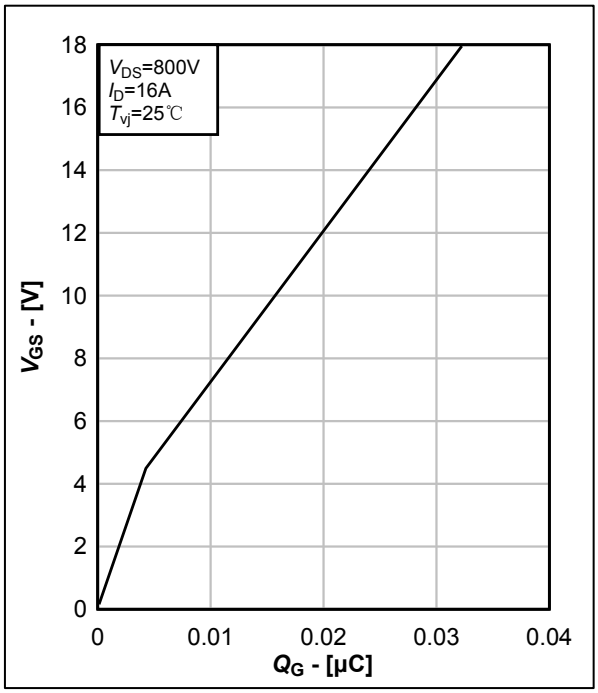


图19. 栅极电荷特性典型曲线, V_{GS} = f (Q_G)
Fig.19 Typical gate charge characteristic, V_{GS}= f (Q_G)

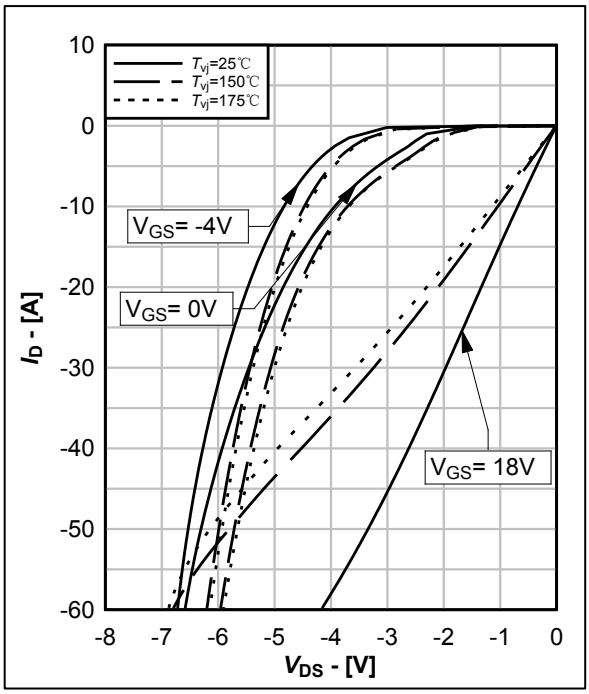


图20. 体二极管及第三象限输出特性典型曲线, I_D = f (V_{DS})
Fig.20 Typical body diode output and 3rd quadrant characteristic, I_D = f (V_{DS})

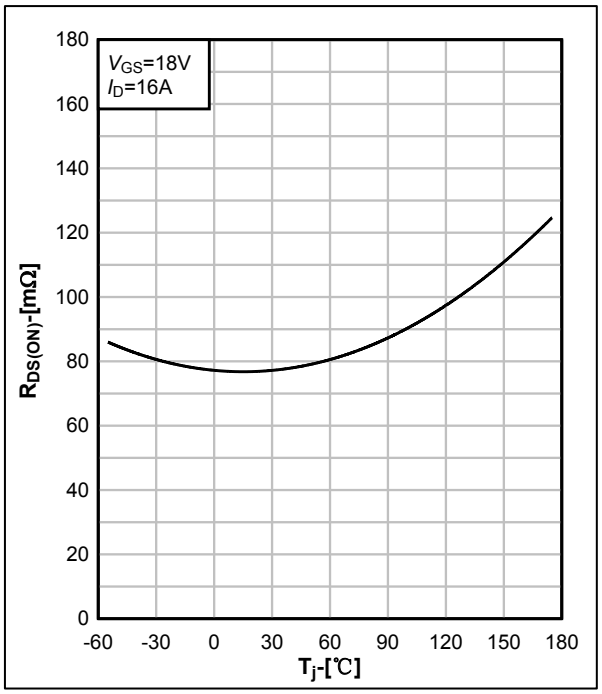


图21. 导通电阻典型曲线, $R_{DS(on)}$ = f (T_j)
Fig.21 Typical On-Resistance characteristics, $R_{DS(on)}$ = f (T_j)

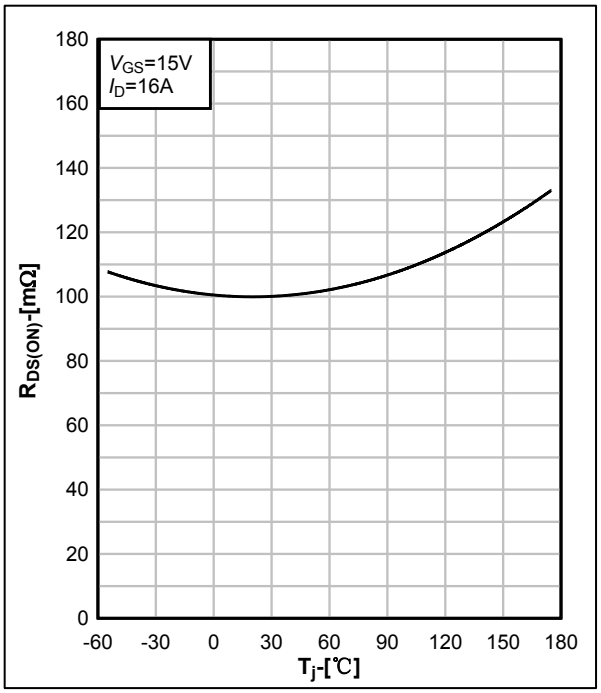


图22. 导通电阻典型曲线, $R_{DS(on)}$ = f (T_j)
Fig.22 Typical On-Resistance characteristics, $R_{DS(on)}$ = f (T_j)

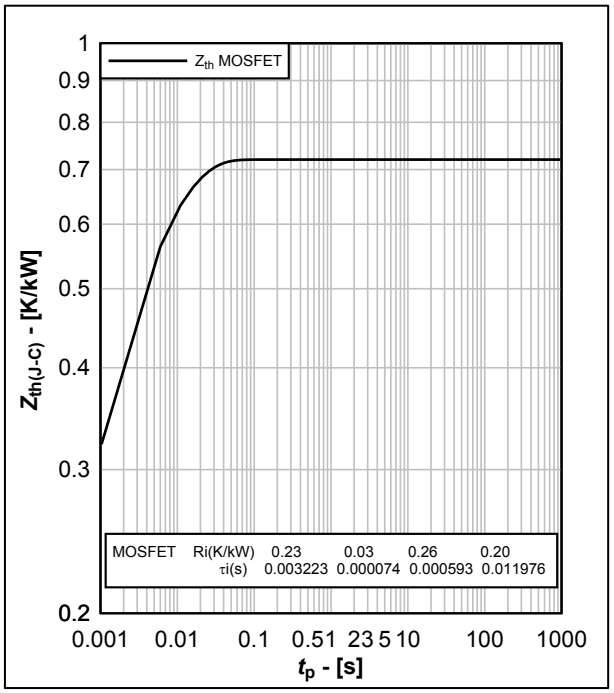


图23. 瞬态热阻抗曲线, $Z_{th(J-C)}$ = f (t_p)
Fig.23 Transient thermal impedance, $Z_{th(J-C)}$ = f (t_p)

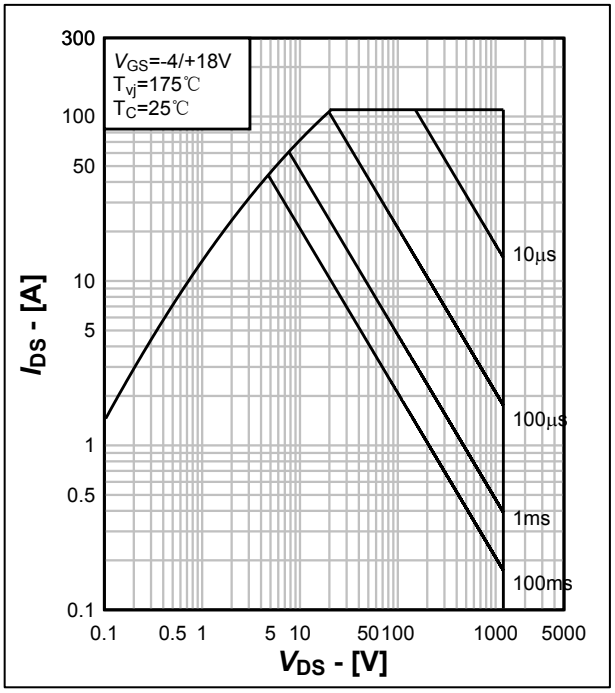
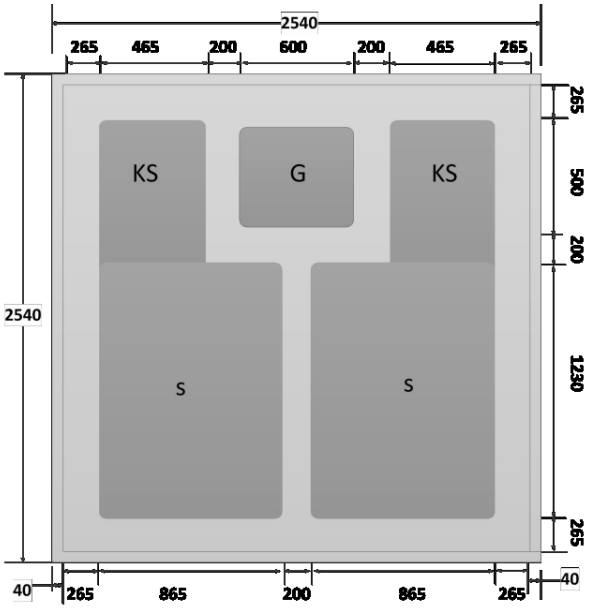


图24. MOSFET安全工作区, I_D = f (V_{DS})
Fig.24 MOSFET Safe Opreating Area, I_D = f (V_{DS})

工艺参数值 **Mechanical Parameters**

芯片尺寸 Chip size	2.54×2.54	mm^2
源极键合区尺寸(不包含开尔文源级) Source pad size (excl. Kelvin Source pad)	2×(0.865×1.23)	mm^2
栅极键合区尺寸 Gate pad size	0.6×0.5	mm^2
总面积 Area total	6.45	mm^2
厚度 Thickness	150±10	μm
晶圆尺寸 Wafer size	150	mm
每片晶圆上最大芯片数 Max. possible chips per wafer	2277	
正面金属 Frontside (Source and Gate) metal	Al:5.0μm	
背面金属 Backside (Drain) metal	Ti:Ni:Ag (0.05:0.5:0.5μm)	
正面钝化 Passivation frontside	Polyimide	
建议存储环境 Recommended storage environment	存储在原始容器中，23°C 干燥氮气柜小于 6 个月 Store in original container, in dry nitrogen, <6 months at an ambient temperature of 23°C	



S=源极 G=栅极 KS=开尔文源极 单位：微米 S=Source G=Gate KS=Kelvin Source Unit: μm

图 25. 芯片外观尺寸

Fig. 25 Chip drawing

株洲中车时代半导体有限公司

ZHUZHOU CRRC TIMES SEMICONDUCTOR CO., LTD

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网 址	Web Site	http:// ctsc.csrzic.com	

使用条件和条款

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