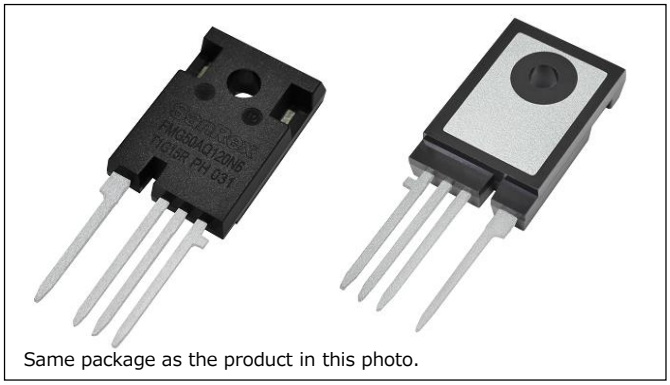
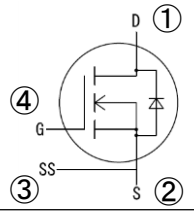
FMG50AQ120N6



Same package as the product in this photo.

V_{RRM} = 1200V
$I_{T(AV)}$ = 50A



① Drain
② Source
③ Sence
④ Gate

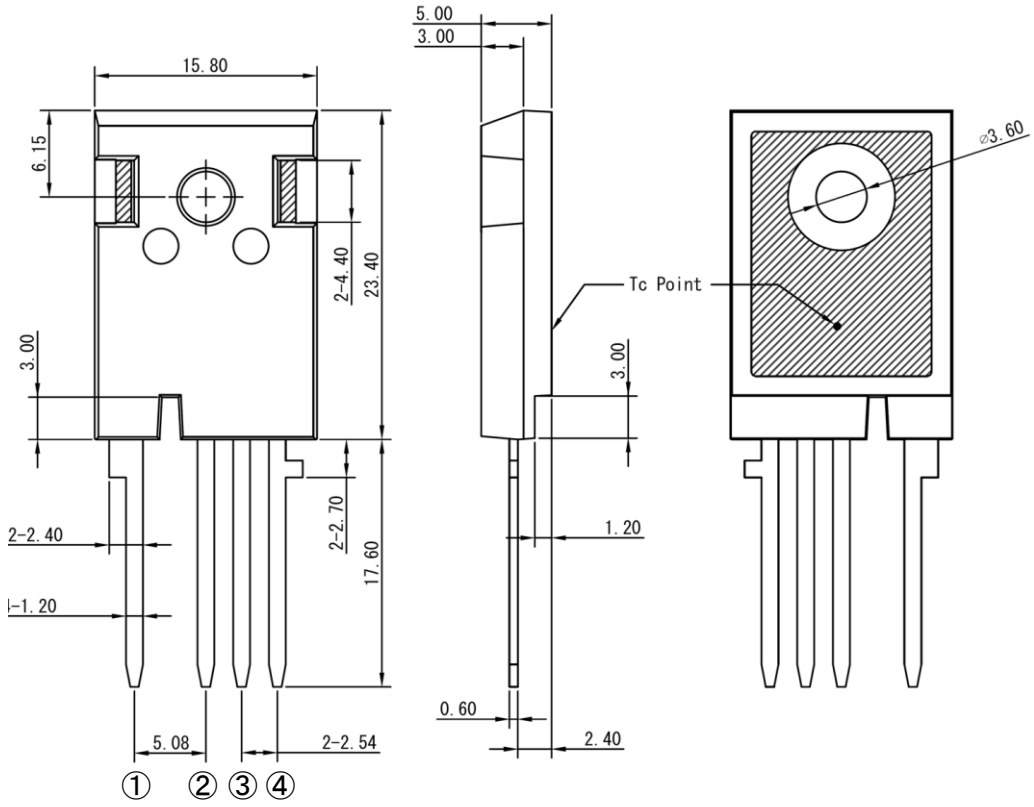
■ TO-247-4L package SiC MOSFET

Advantages

- Low power loss thanks to loss $R_{DS(on)}$ and low switching loss.
- Low temperature dependency of $R_{DS(on)}$ reducing thermal runaway risks at high temperature operation
- Safe gate driving at high frequency operation through optimized $V_{GS(th)}$(4.0V)
- The four-pin TO-247-4L package further enhancing the high-speed switching performance of SiC MOSFET
- Top level short circuit tolerance enabling safety design of equipment
- No additional FWD required

Applications

- Industrial Inverters, DC-DC Converters, EV Battery Chargers, Resonant Power Supply



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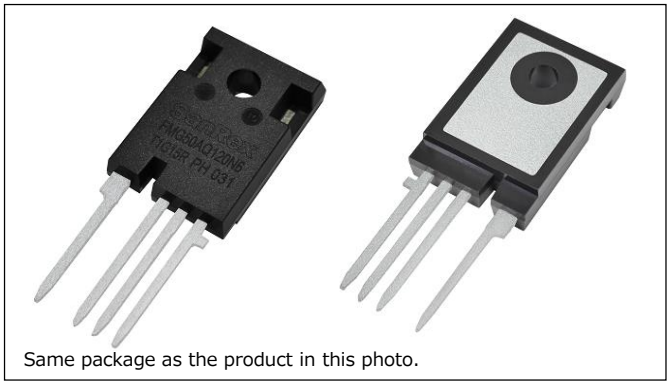
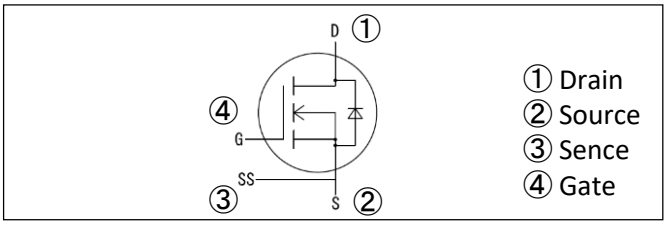

Same package as the product in this photo.

V_{RRM} = 1200V
$I_{T(AV)}$ = 50A



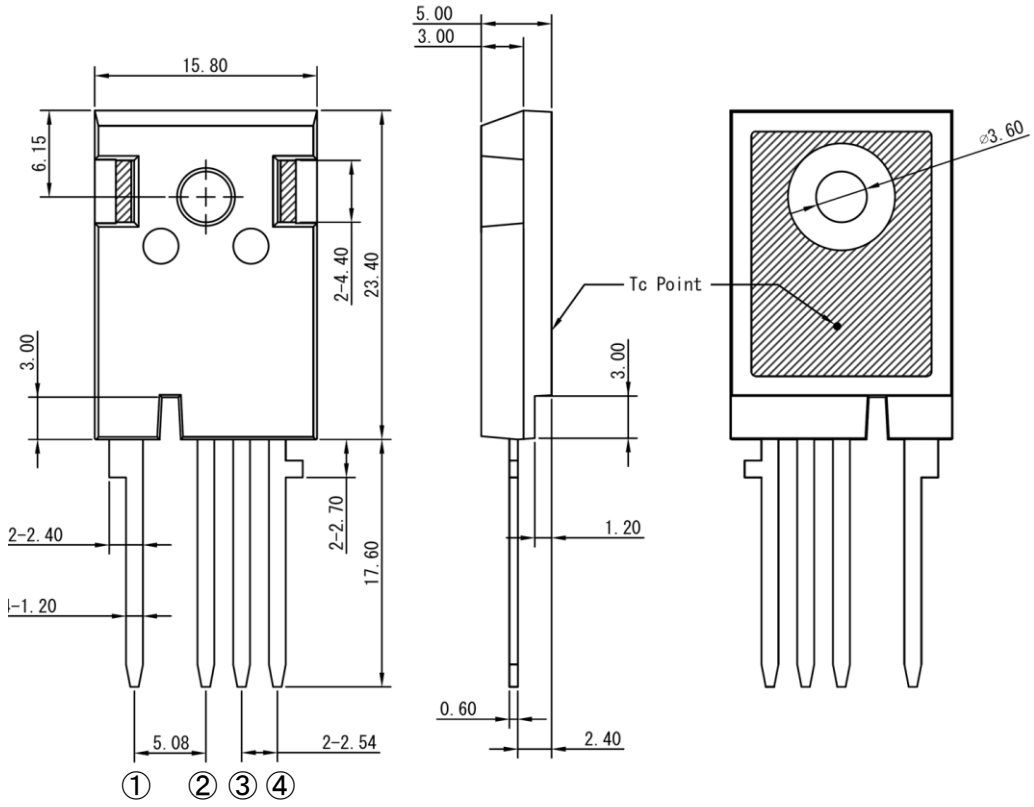
■ TO-247-4L package SiC MOSFET

特 長

- 小さいオン抵抗とスイッチングロスによる低損失
- 熱暴走に強い温度変化の小さいオン抵抗
- 高周波動作での高いノイズ特性をもたらすゲート特性（$V_{GS(th)}$：4.0V）
- SiC MOSFETの高速スイッチング性能を引き出す４ピンのTO-247-4Lパッケージを採用
- 回路保護設計が容易なトップレベルの短絡耐量
- 外付けFWD不要

用 途

- 産業用インバータ、DC-DCコンバータ、EV充電器、共振電源



■ Maximum Ratings (Tj=25℃ unless otherwise specified)

Item	Symbol	Unit	Ratings	Conditions
Drain-Source Voltage	V_{DSS}	V	1200	
Gate-Source Voltage(+)	V_{GSS}	V	22	
Gate-Source Voltage(-)		V	-7	
Drain Current	I_D	A	50	V_{GS}=20V, Tc=108℃, DC
	$I_{D(pulse)}$	A	150	Pulse
Source Current	I_S	A	50	V_{GS}=-5V, Tc=108℃, DC
	$I_{S(pulse)}$	A	150	Pulse
Total Power Dissipation	P_{tot}	W	440	T_C=25℃
Operating Junction Temperature	T_j	℃	-40～+150	
Storage Temperature	T_{stg}	℃	-40～+150	
Isolation Voltage	V_{iso}	V	2500	AC, RMS, 1min

■ Electrical Characteristics (Tj=25℃ unless otherwise specified)

Item	Symbol	Unit	Ratings			Conditions
			Min.	Typ.	Max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V	1200			V_{GS}=0V, I_D=100μA
Static Drain-Source On-State Voltage	$V_{DS(on)}$	V		0.65	1.40	V_{GS}=20V, I_D=50A
				0.75	1.50	V_{GS}=20V, I_D=50A, T_j=150℃
On-State Resistance	$R_{DS(on)}$	mΩ		13.0	28.0	V_{GS}=20V, I_D=50A
				15.0	30.0	V_{GS}=20V, I_D=50A,T_j=150℃
Drain Cutoff Current	I_{DSS}	μA			100	V_{DS}=1200V, V_{GS}=0V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V	3	4	5	V_{DS}=10V, I_D=1.5mA
Gate-Source Leakage Current	I_{GSS}	nA			100	V_{GS}=20V, V_{DS}=0V
Switching Characteristics	$t_{d(on)}$	ns		54		I_D=50A, V_{DS}=600V, V_{GS}=+20V/-5V, R_G=6.8Ω, L=480μH
	t_r	ns		48		
	t_{rr}	ns		42		
	$t_{d(off)}$	ns		92		
	t_f	ns		62		
Total Gate Charge	Q_G	nC		290		I_D=50A, V_{DS}=600V, V_{GS}=+20V/-5V
Input Capacitance	C_{iss}	nF		9.0		V_{DS}=20V, V_{GS}=0V, f=100kHz
Output Capacitance	C_{oss}	nF		2.5		
Reverse Transfer Capacitance	C_{rss}	nF		0.2		
Source-Drain Voltage	V_{SD}	V		2.65	2.90	V_{GS}=-5V, I_S=50A
				2.65	2.95	V_{GS}=-5V, I_S=50A, T_j=150℃
Total Capacitive Charge	Q_c	nC		700		I_{SD}=50A, V_{DS}=600V, di_{SD}/dt=800A/μs, V_{GS}=-5V
Internal Gate Resistance	$R_{G(int)}$	Ω		0.8		
Internal Stray Inductance	Ls	nH		6		between Drain and Source (root of terminal)

■ Thermal Characteristics (Tj=25℃ unless otherwise specified)

Junction-to-Case Thermal Resistance	$R_{th(j-c)}$	℃/W		0.22	0.28	
Case-to-Heat sink Thermal Resistance	$R_{th(c-f)}$	℃/W		1.7		Thermal conductivity = 9×10^{-3} W/cm・℃

■ Mechanical Characteristics (Tj=25℃ unless otherwise specified)

Weight	-	g		4.8		
Mounting Torque(M3)	-	N・m			0.8	Main terminals and mounting to heat sink Recommended value 0.4~0.5N・m

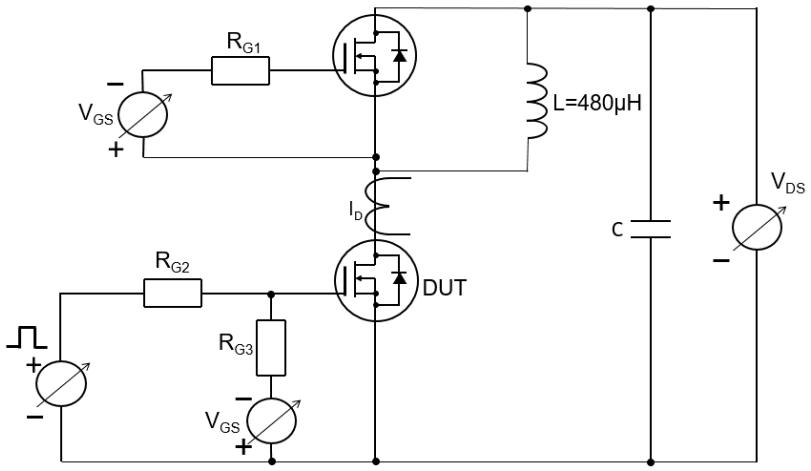


Fig.1 Inductive load switching time test circuit

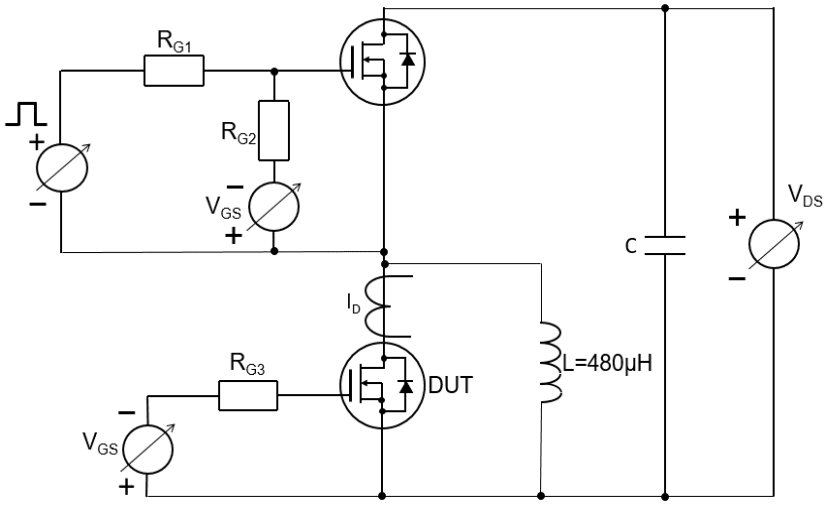


Fig.2 Inductive load recovery switching time test circuit

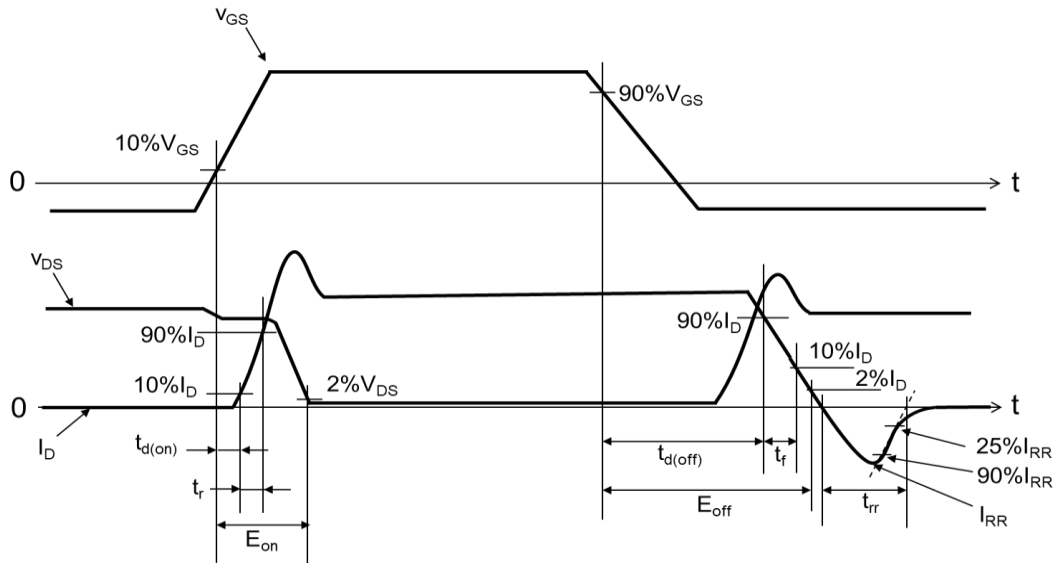


Fig.3 Switching waveform at the time of Inductive load

Fig.4 Output Characteristics (Typical)

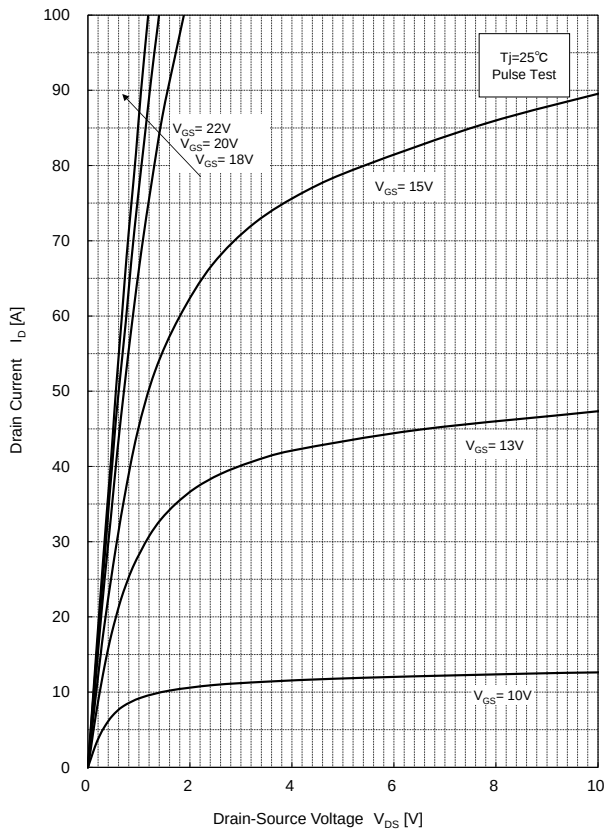


Fig.5 Output Characteristics (Typical)

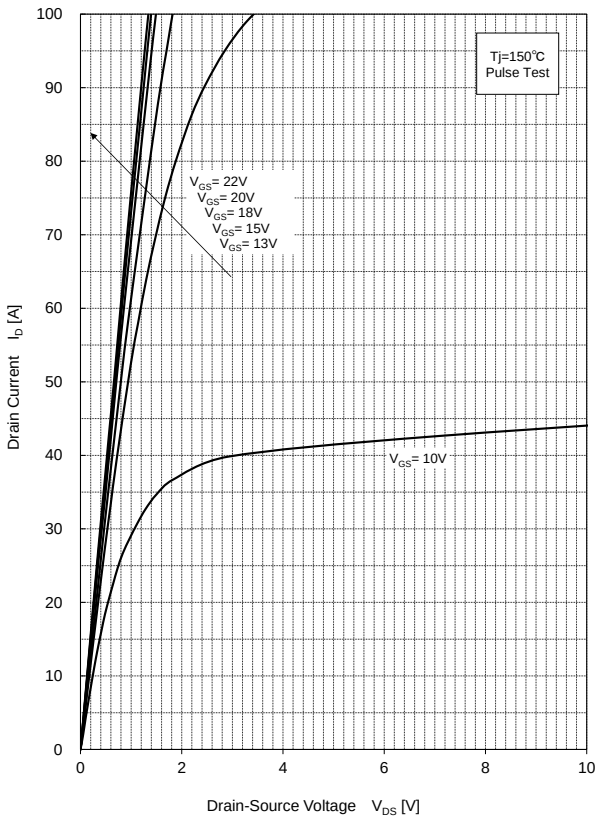


Fig.6 Transfer Characteristics (Typical)

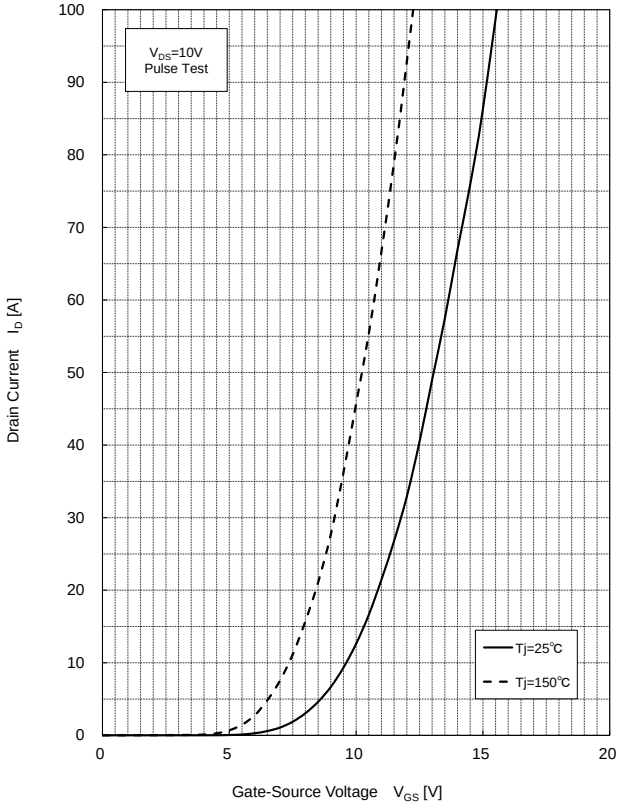


Fig.7 3rd Quadrant Characteristics (Typical)

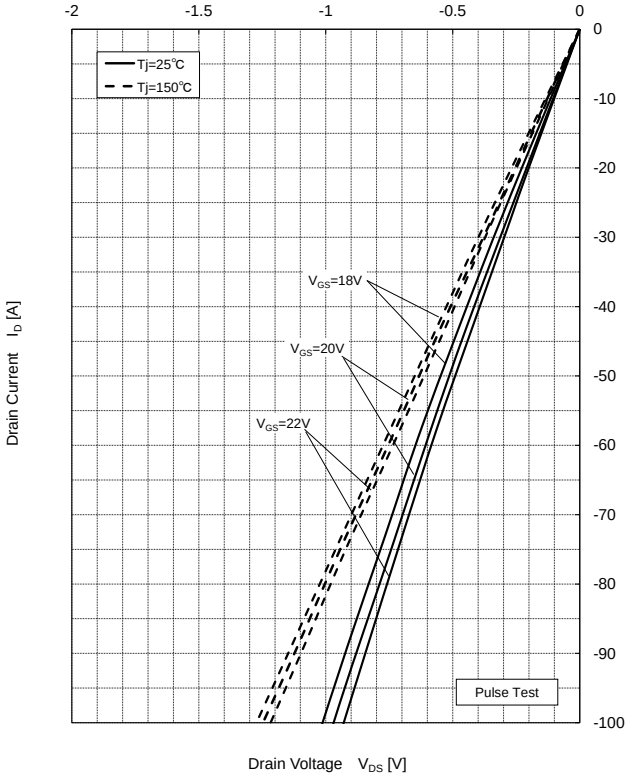


Fig.8 3rd Quadrant Characteristics (Typical)

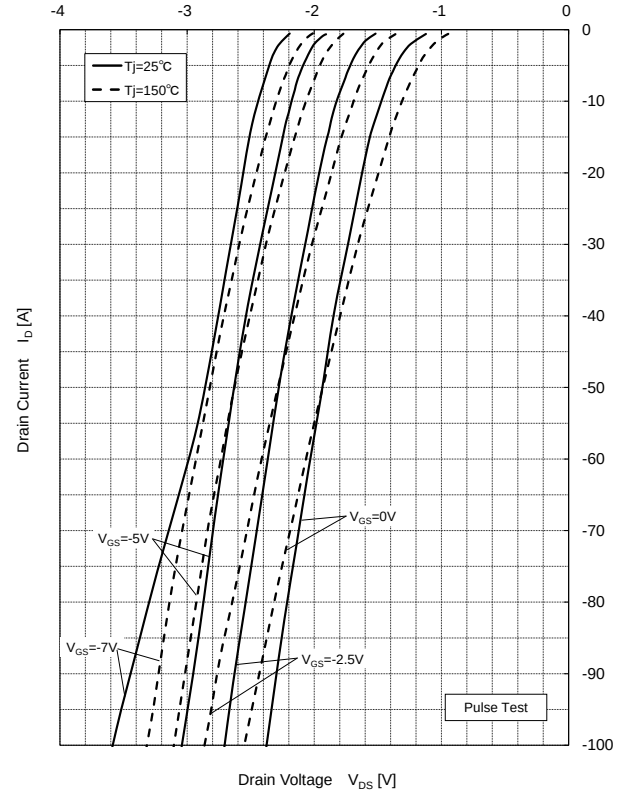


Fig.9 On-State Resistance vs Junction Temperature (Typical)

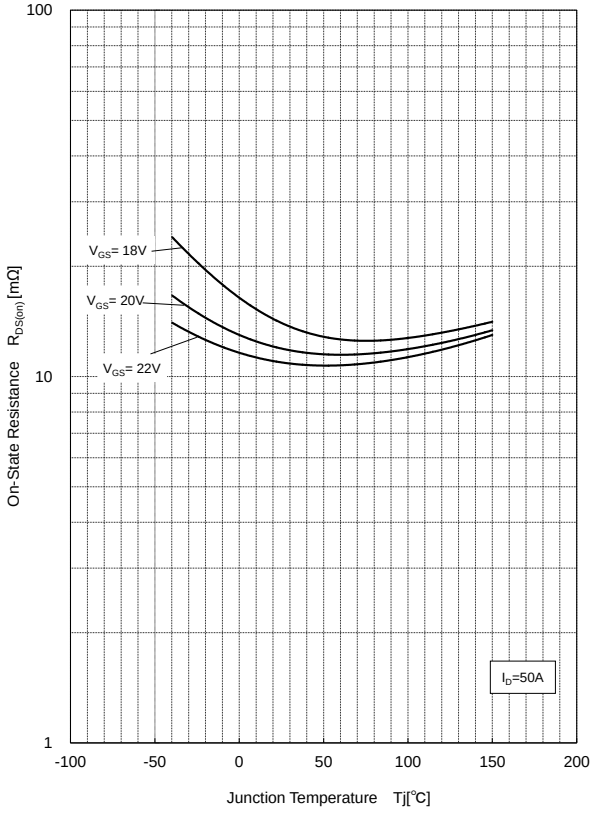


Fig.10 Source-Drain Voltage vs Junction Temperature (Typical)

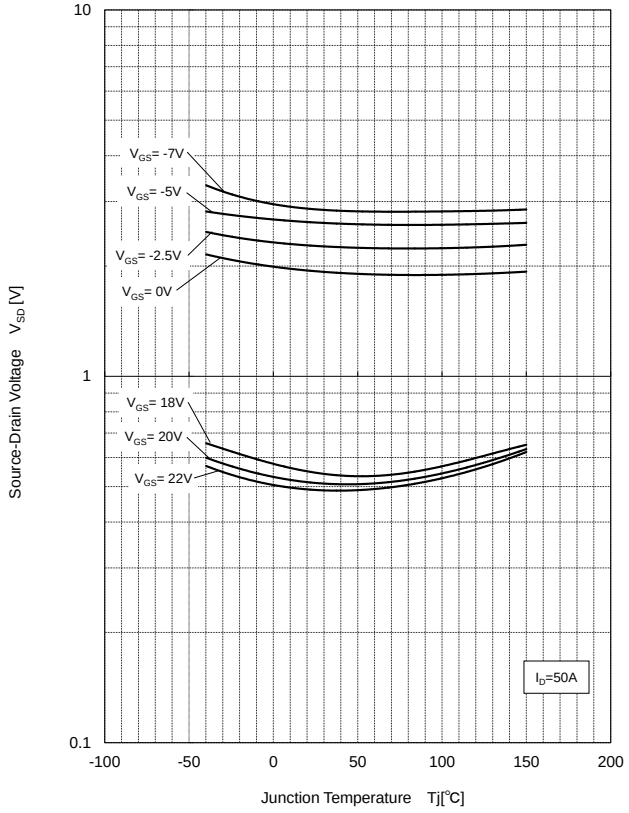


Fig.11 Capacitance (Typical)

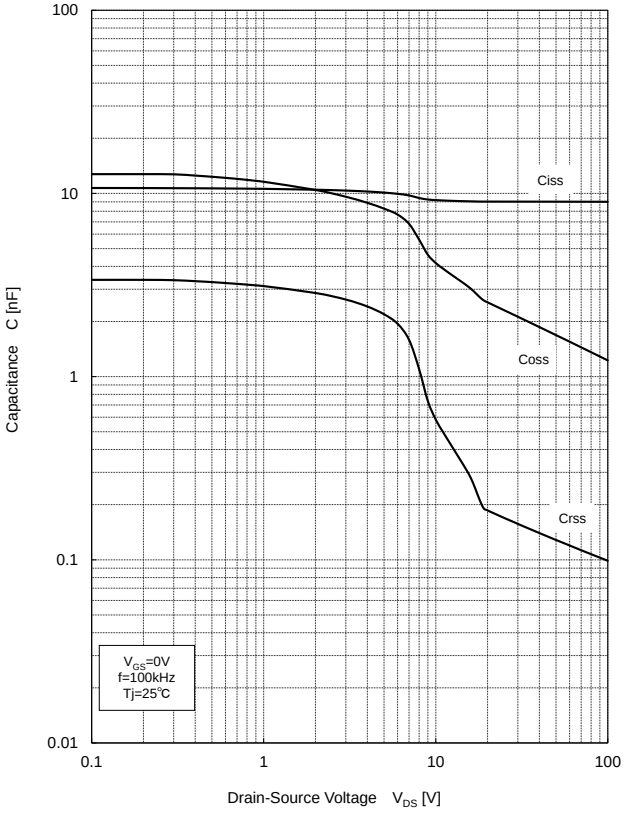


Fig.12 Gate Charge Characteristics (Typical)

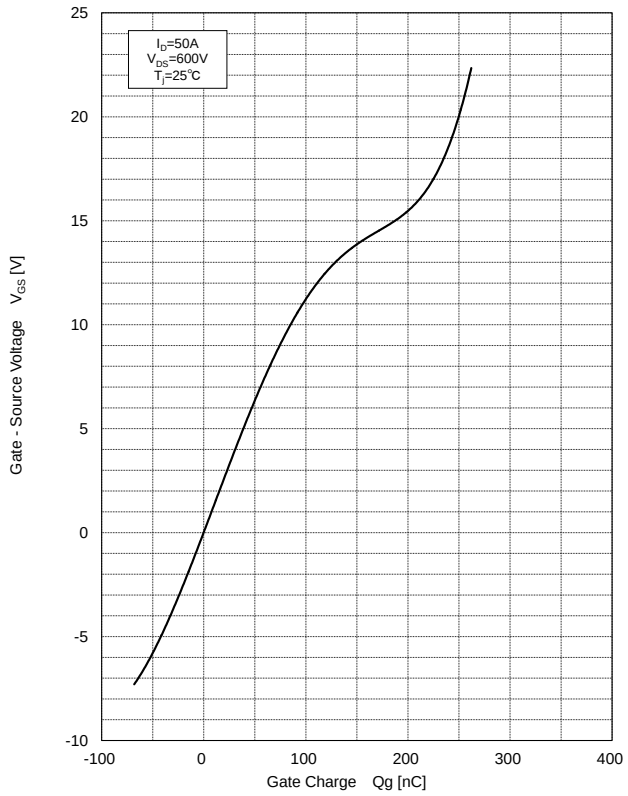


Fig.13 Switching Time vs Drain Current (Typical)

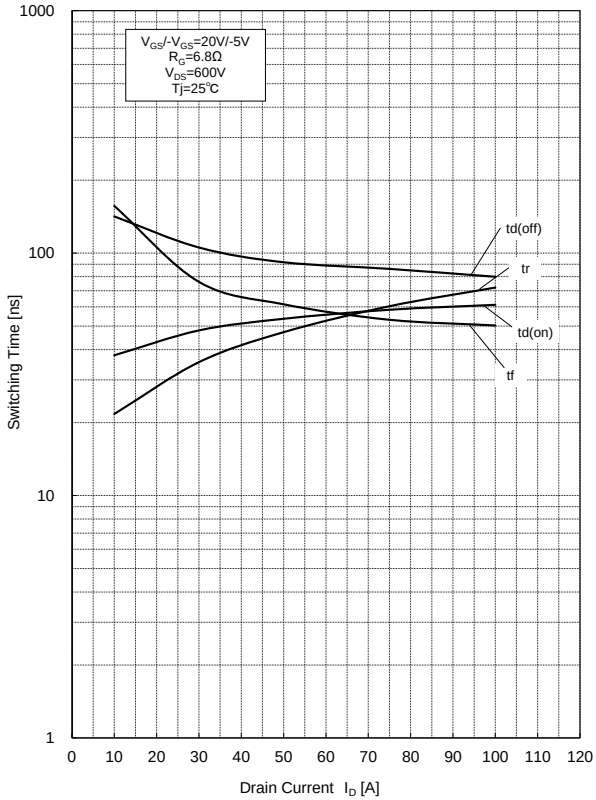


Fig.14 Switching Time vs Drain Current (Typical)

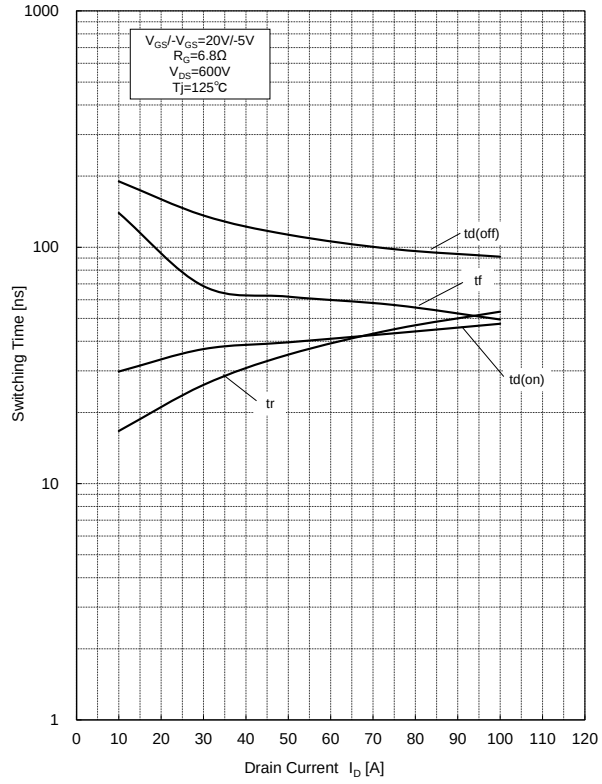


Fig.15 Switching Time vs Drain Current (Typical)

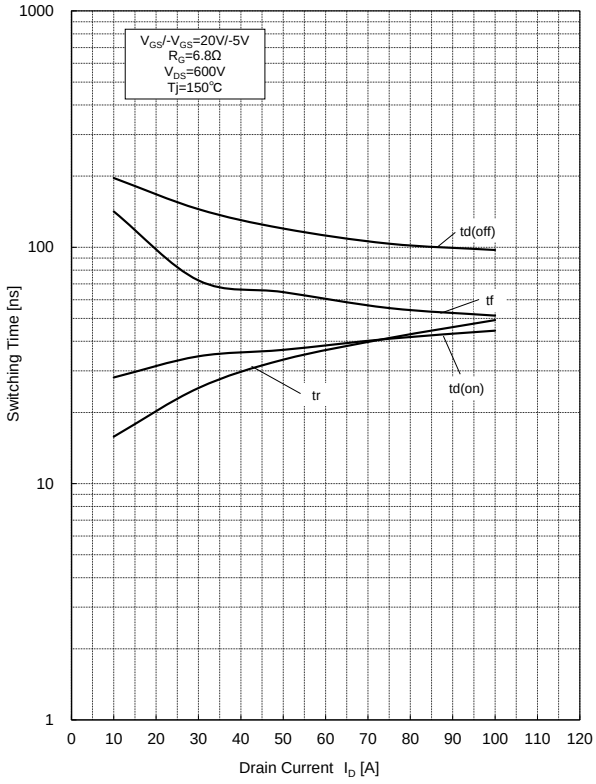


Fig.16 Switching Loss vs Drain Current (Typical)

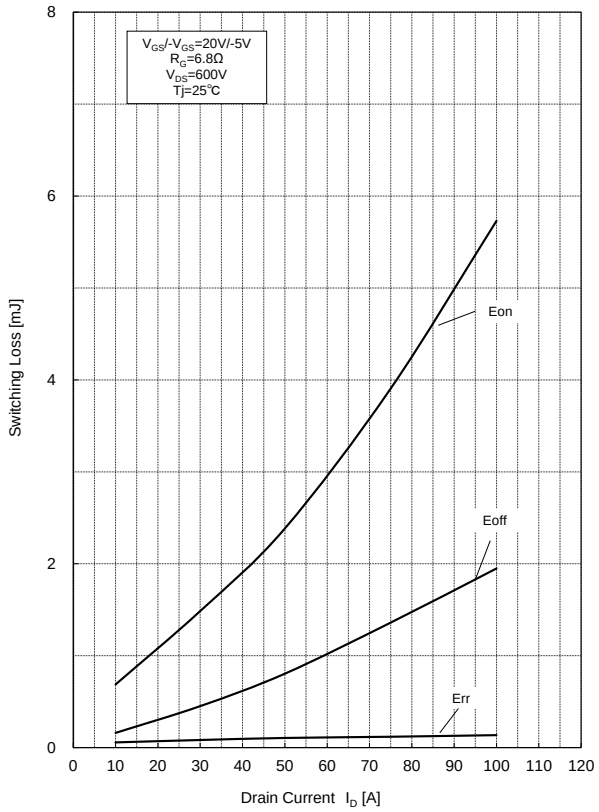


Fig.17 Switching Loss vs Drain Current (Typical)

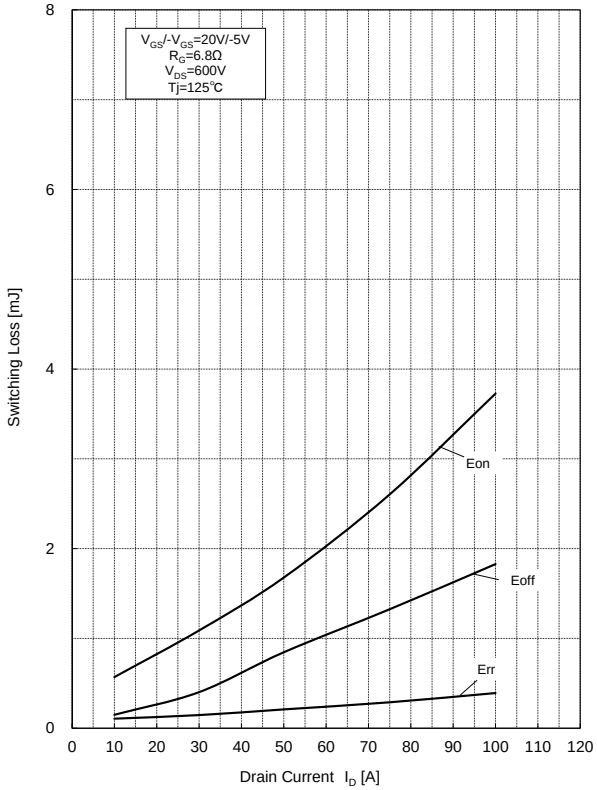


Fig.18 Switching Loss vs Drain Current (Typical)

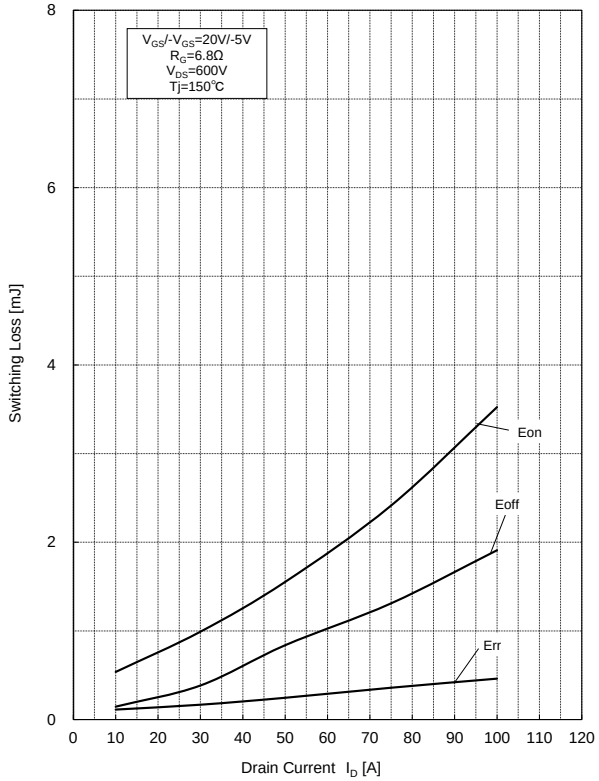


Fig.19 Switching Time vs Gate Resistance (Typical)

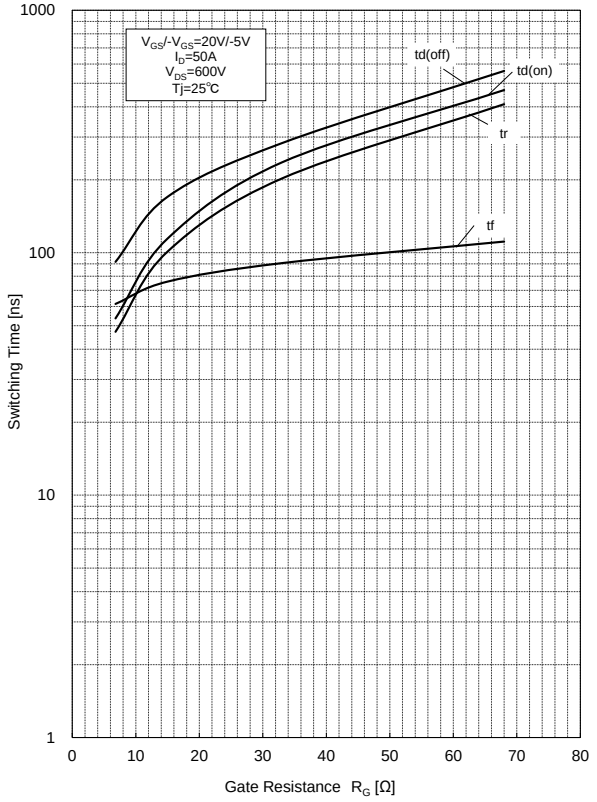


Fig.20 Switching Time vs Gate Resistance (Typical)

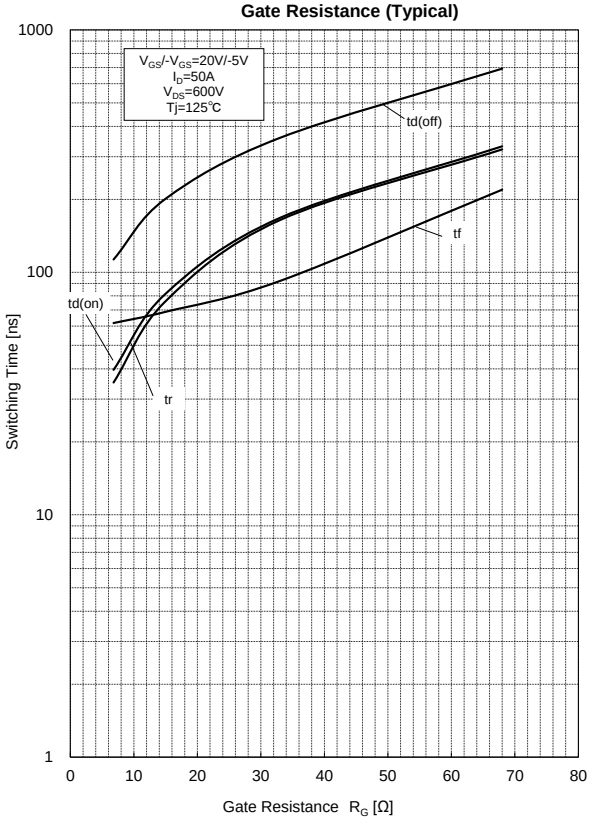


Fig.21 Switching Time vs Gate Resistance (Typical)

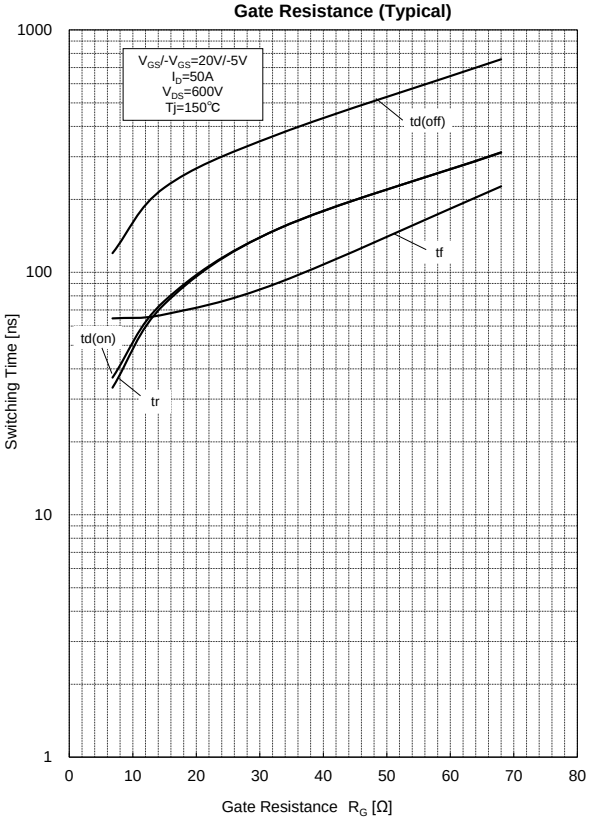


Fig.22 Switching Loss vs Gate Resistance (Typical)

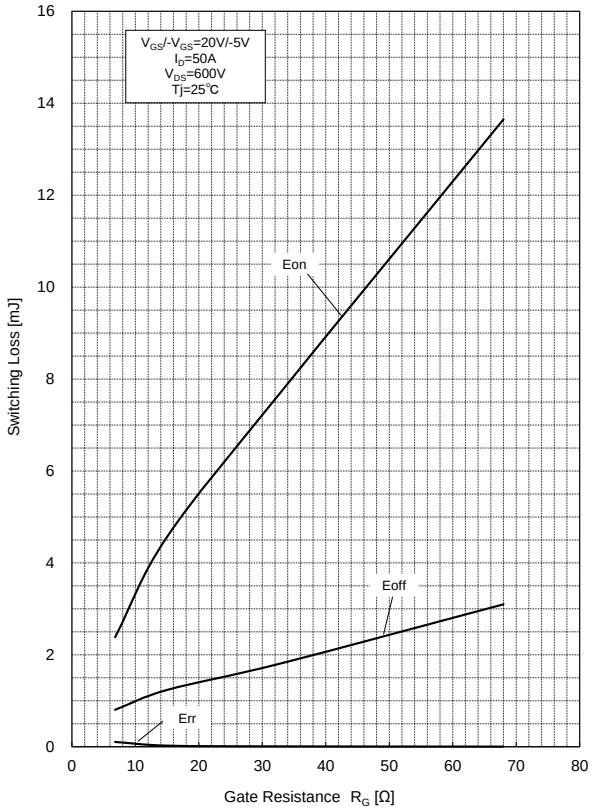


Fig.23 Switching Loss vs Gate Resistance (Typical)

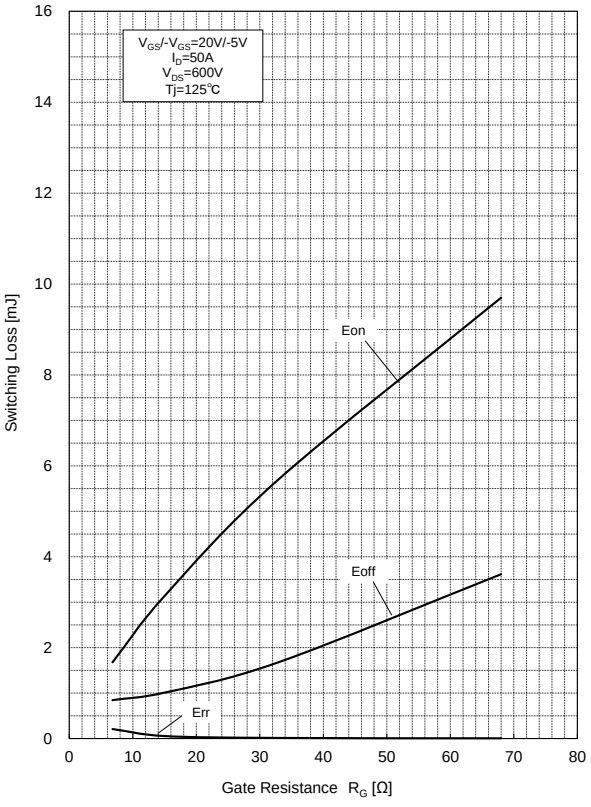


Fig.24 Switching Loss vs Gate Resistance (Typical)

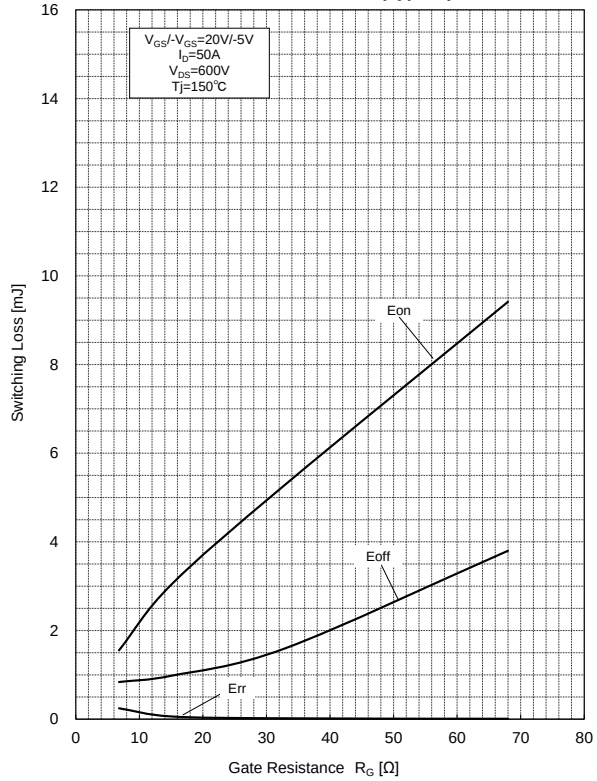


Fig.25 Recovery Characteristics vs Drain Current (Typical)

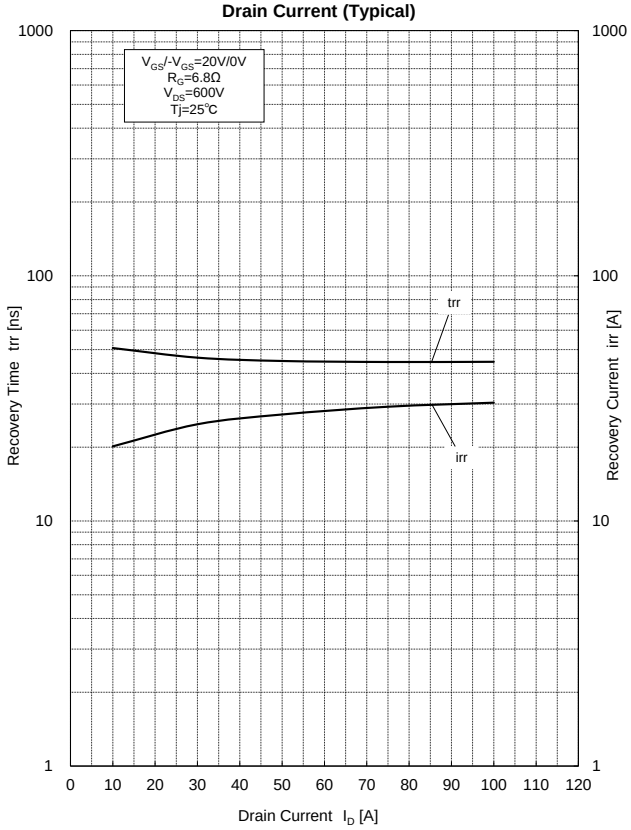


Fig.26 Recovery Characteristics vs Drain Current (Typical)

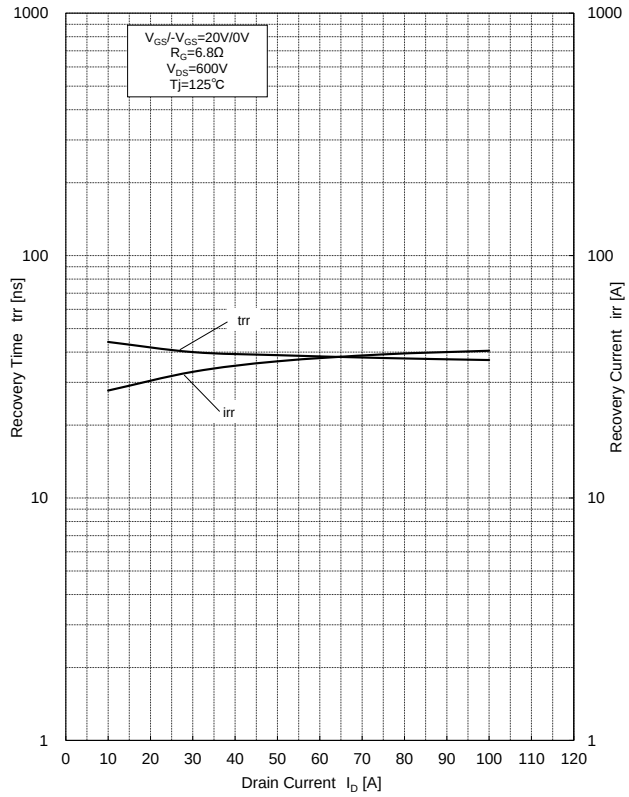


Fig.27 Recovery Characteristics vs Drain Current (Typical)

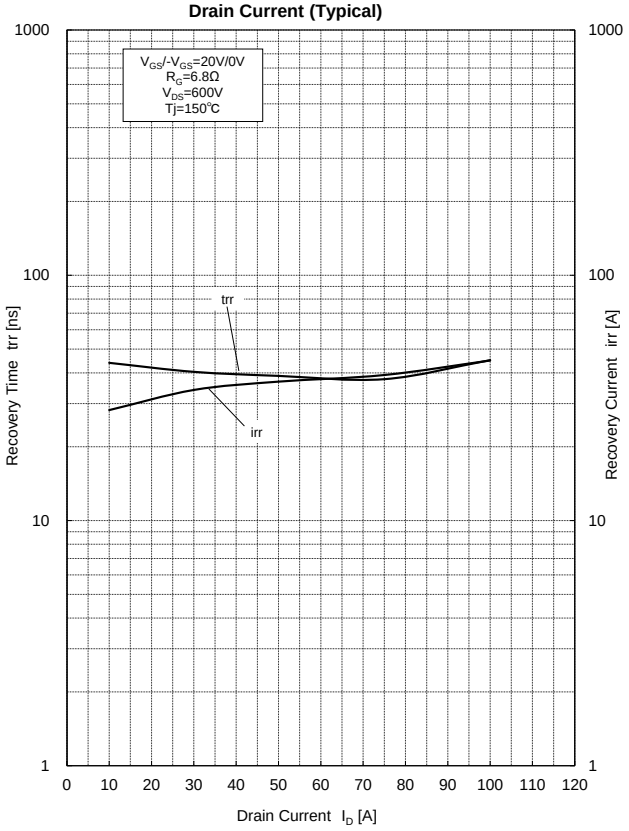


Fig.28 Recovery Characteristics vs Drain Current (Typical)

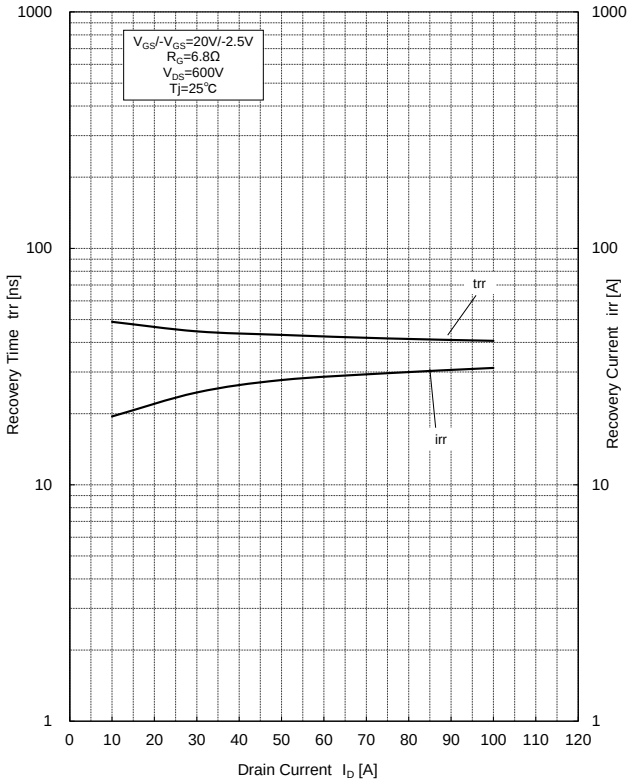


Fig.29 Recovery Characteristics vs Drain Current (Typical)

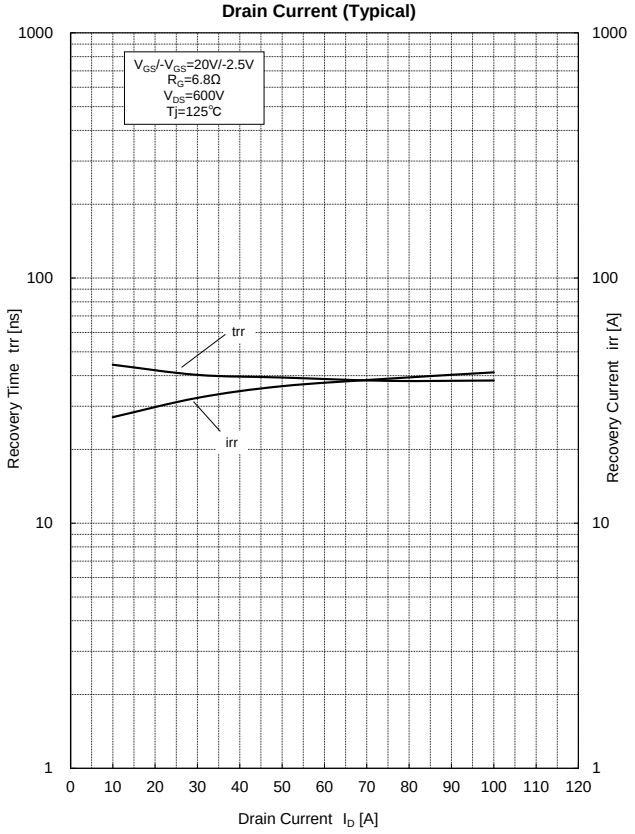


Fig.30 Recovery Characteristics vs Drain Current (Typical)

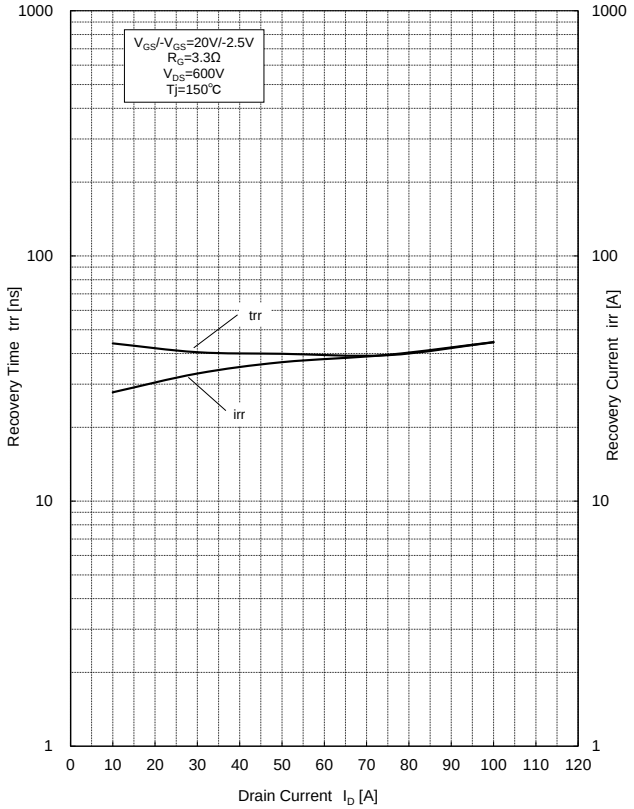


Fig.31 Recovery Characteristics vs Drain Current (Typical)

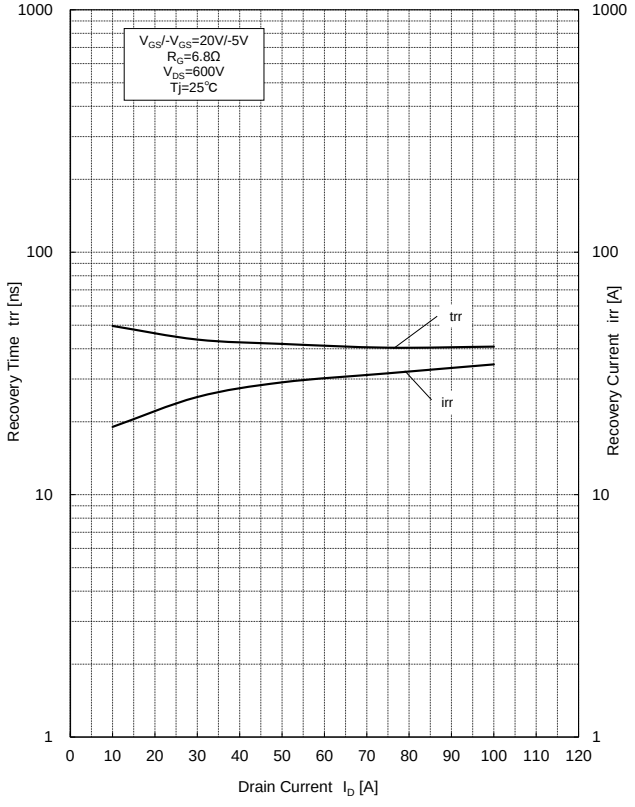


Fig.32 Recovery Characteristics vs Drain Current (Typical)

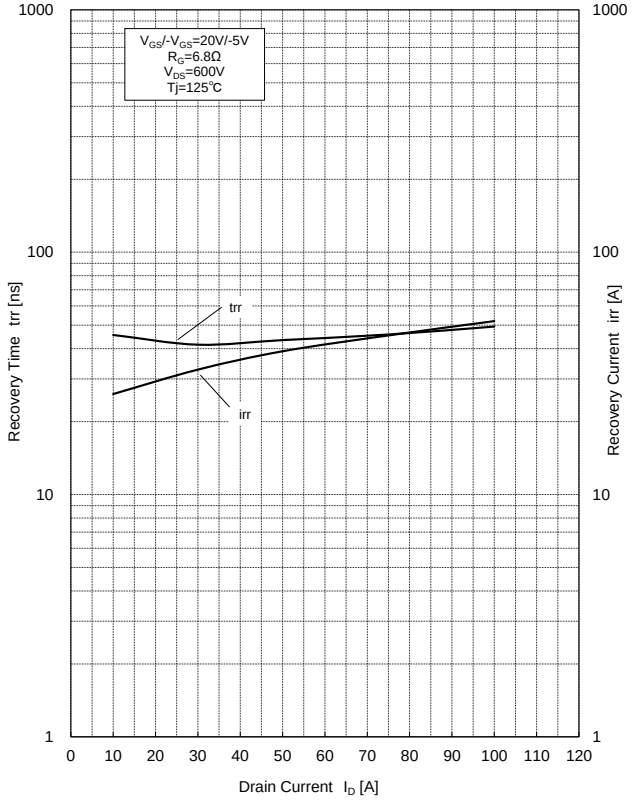


Fig.33 Recovery Characteristics vs Drain Current (Typical)

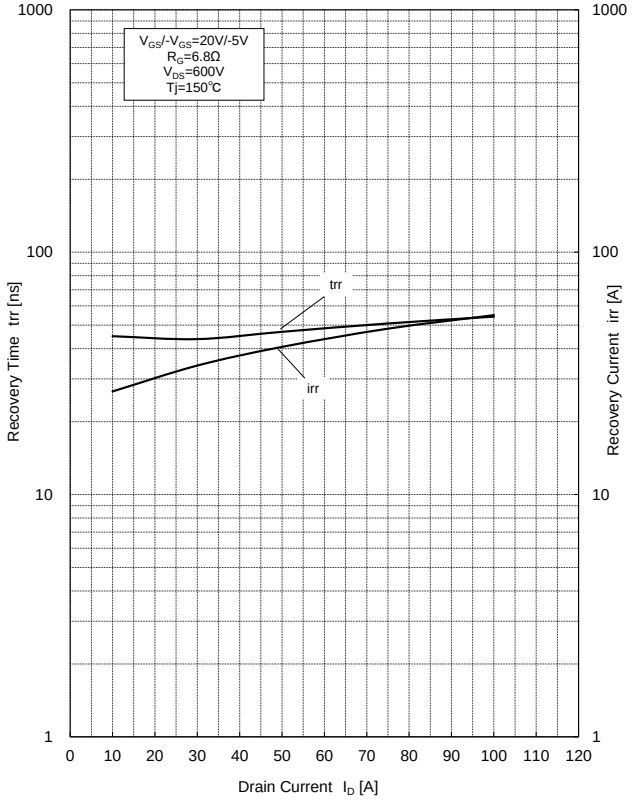


Fig.34 Recovery Characteristics vs Gate Resistance (Typical)

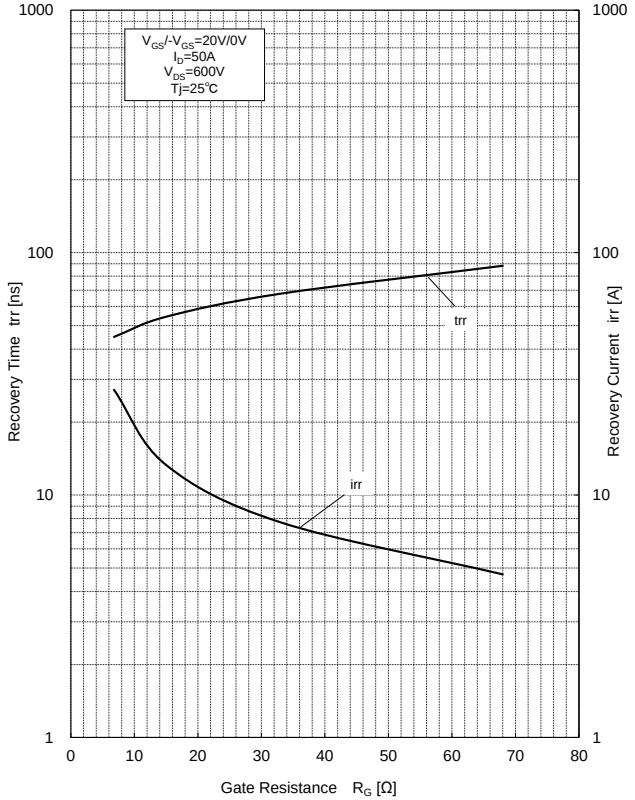


Fig.35 Recovery Characteristics vs Gate Resistance (Typical)

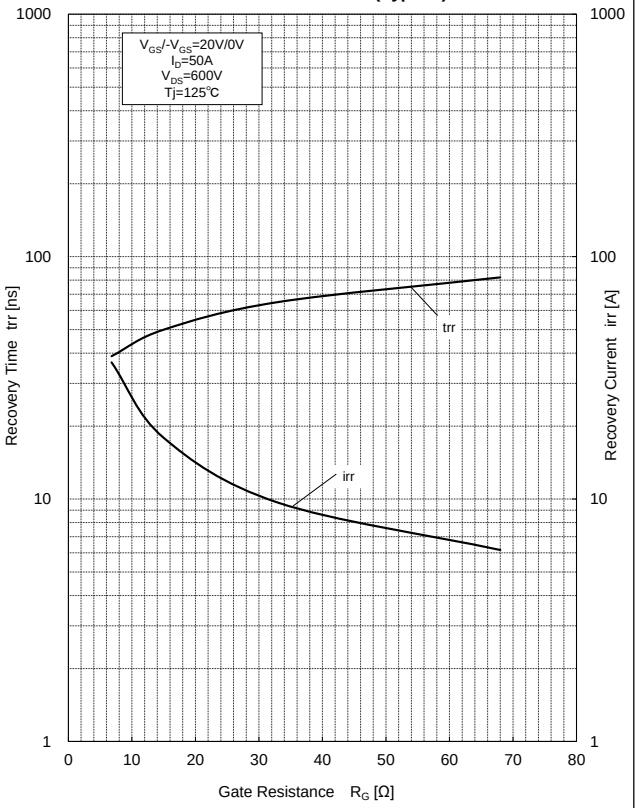


Fig.36 Recovery Characteristics vs Gate Resistance (Typical)

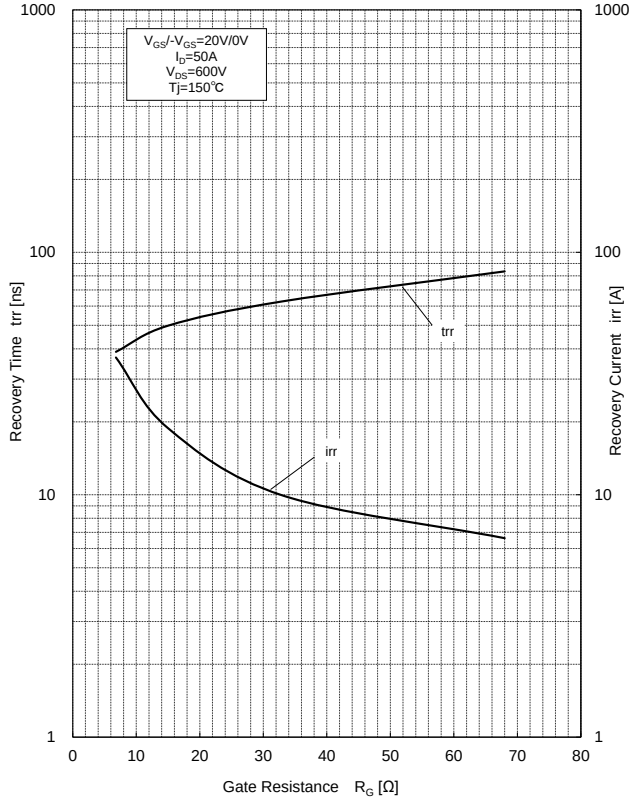


Fig.37 Recovery Characteristics vs Gate Resistance (Typical)

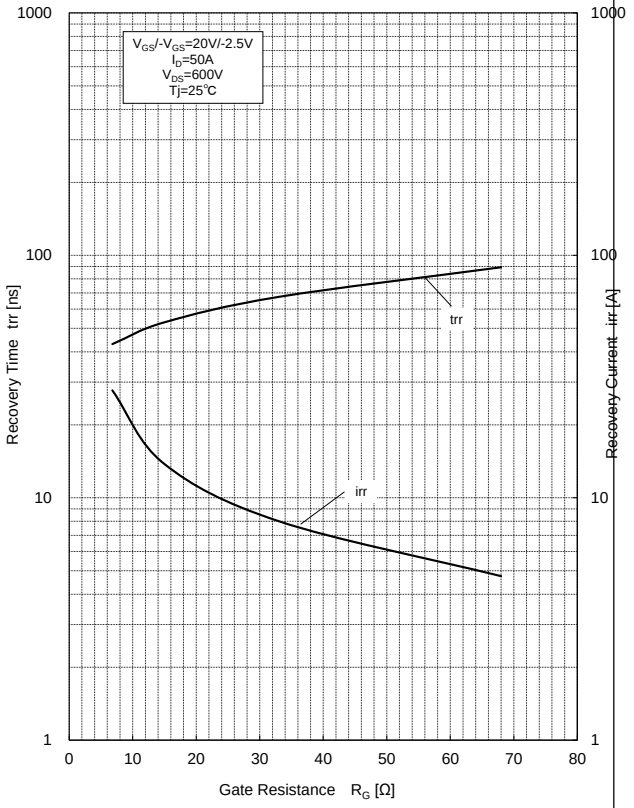


Fig.38 Recovery Characteristics vs Gate Resistance (Typical)

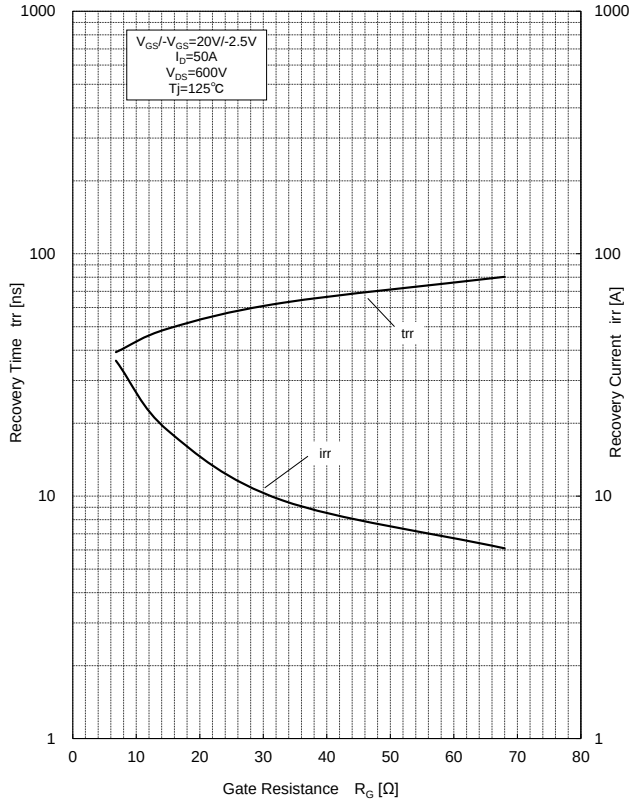


Fig.39 Recovery Characteristics vs Gate Resistance (Typical)

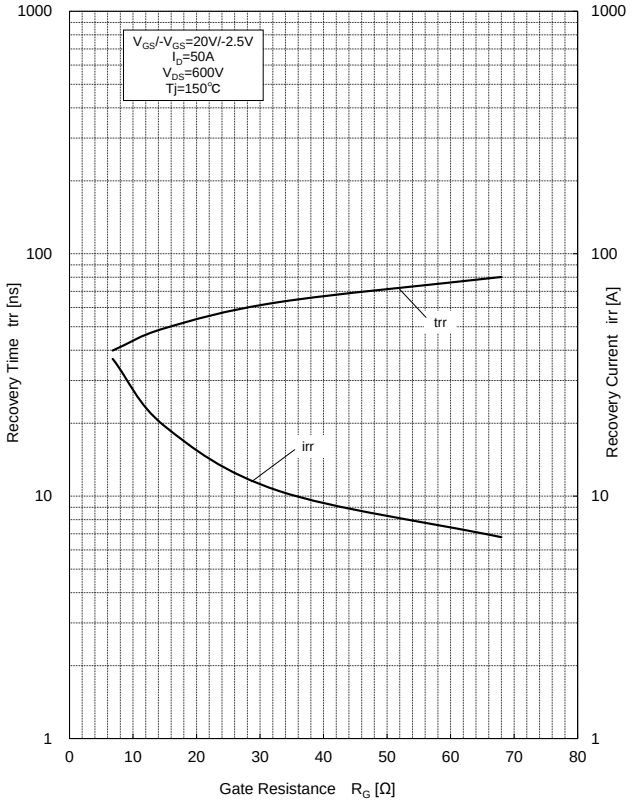


Fig.40 Recovery Characteristics vs Gate Resistance (Typical)

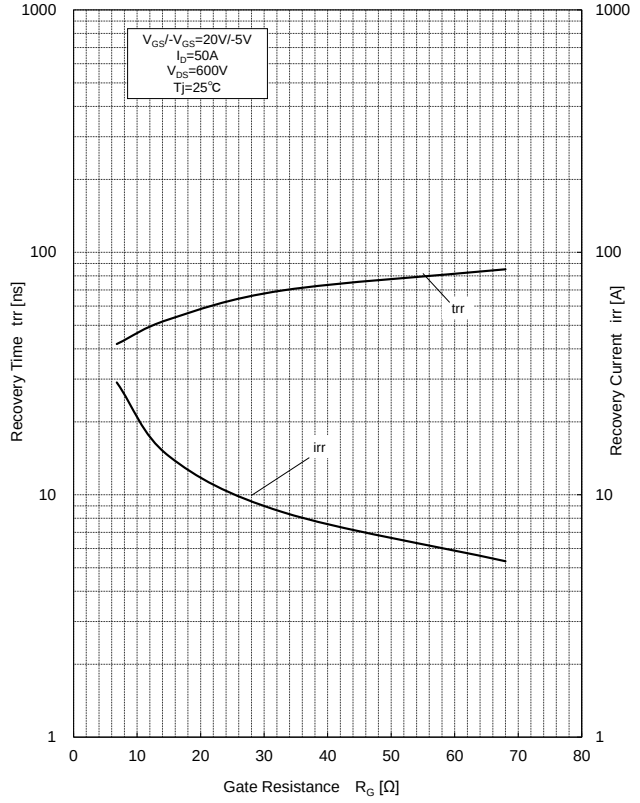


Fig.41 Recovery Characteristics vs Gate Resistance (Typical)

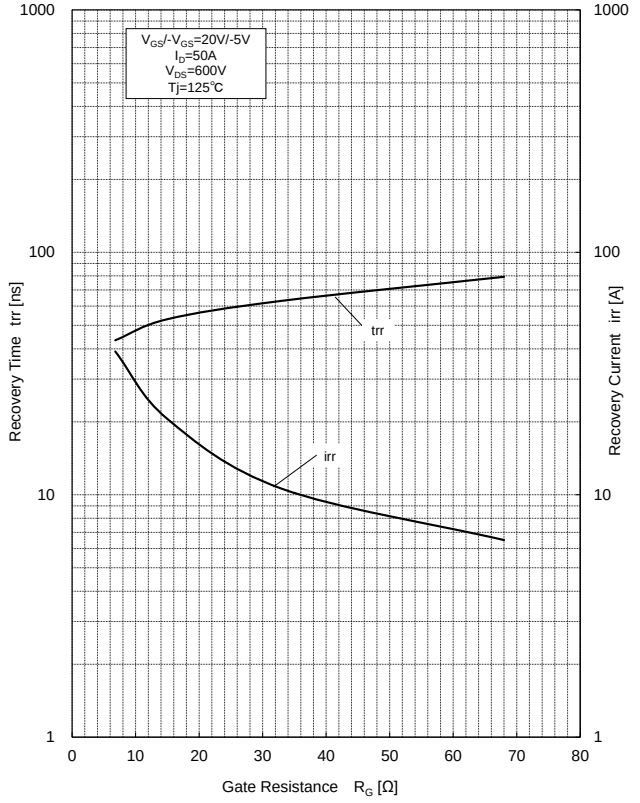


Fig.42 Recovery Characteristics vs Gate Resistance (Typical)

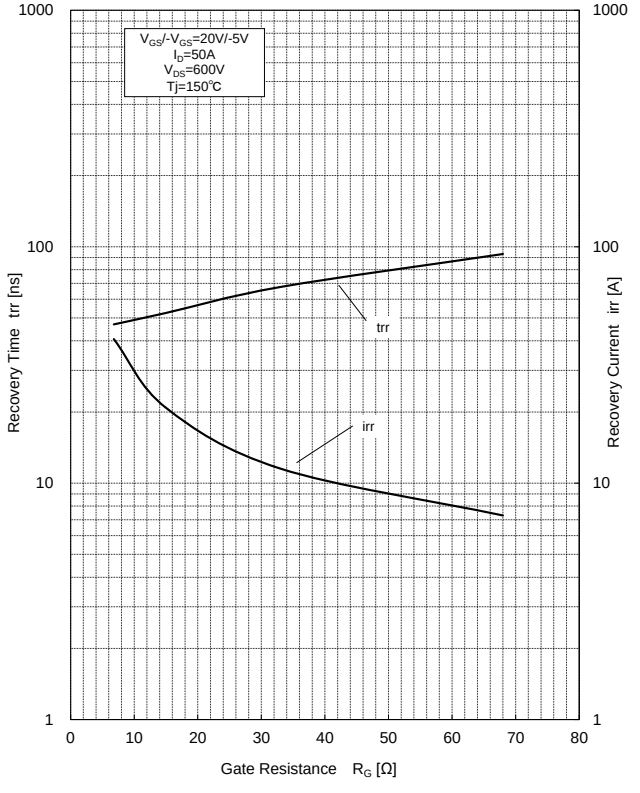


Fig.43 Safe Operating Area

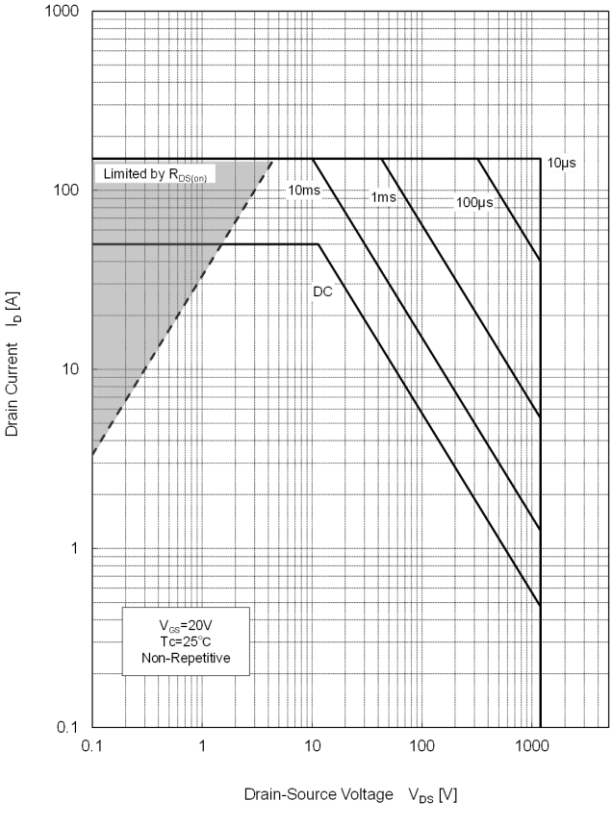


Fig.44 Transient Thermal Impedance