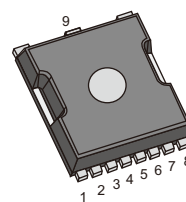


Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- Easy to Parallel
- Simple to Drive

Product Summary			
V _{DS}	R _{DS(on)} (mΩ)Typ	I _D (A)	Q _g (Typ)
650V	40 @ 18V 20A	58	40nc

TOLL



Mechanical Data

- Case:TOLL Package

Application

- EV Charging
- Renewable Energy
- Automotive DC/DC converters
- Server Power Supplies

Block Diagram

Pin Definition:

- 1. Gate
- 2. Kelvin Source
- 9. Drain
- 3/4/5/6/7/8. Power Source

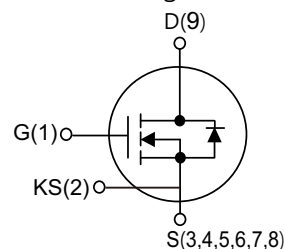


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	650	V
Gate-Source Voltage(Max)	V _{GS(max)}	-10/+23	V
Recommend Gate-Source Voltage	V _{GSop}	-5/+18	V
Continuous Drain Current	I _D	T _C =25°C	58
		T _C =100°C	41
Pulsed Drain Current (Note 1)	I _{DM}	170	A
Power Dissipation T _C =25°C	P _D	214	W
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC40N65T	Unit
Thermal resistance Junction to Case	R _{θJC}	0.70	°C/W
Thermal resistance Junction to Ambient	R _{θJA}	40	°C/W

Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V,I _D =250μA	650	-	-	V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =650V,V _{GS} =0V,T _J =25°C	-	-	100	μA
			V _{DS} =650V,V _{GS} =0V,T _J =175°C	-	-	3.5	mA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =23V,V _{DS} =0V	-	-	250	nA
	Reverse		V _{GS} = -10V,V _{DS} =0V	-	-	-250	nA
On Characteristics							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} ,I _D =7.5mA	2.0	3.0	4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =18V,I _D =20A,T _J =25°C	-	40	52	mΩ
			V _{GS} =18V,I _D =20A,T _J =175°C	-	48	-	
Gate Resisitance		R _G	f=1MHz	-	2	-	Ω
Dynamic Characteristics							
Input Capacitance	C _{ISS}	V _{DS} =400V,V _{GS} =0V, f=1MHz,V _{AC} =25mV	-	1305	-	pF	
Output Capacitance	C _{OSS}		-	109	-	pF	
Reverse Transfer Capacitance	C _{RSS}		-	5	-	pF	
Coss stored energy	E _{OSS}	V _{DS} =400V,f=1MHz	-	12	-	μJ	
Turn-on switching energy	E _{ON}	V _{DS} =400V,I _D =20A,V _{GS} = -5/18V, R _G =2.5Ω,Load=100μH	-	133	-	μJ	
Turn-off switching energy	E _{OFF}		-	44	-	μJ	
Turn-On Delay Time	td(on)	V _{DS} =400V,I _D =20A V _{GS} = -5/18V,R _G =2.5Ω, RL=20Ω	-	7	-	ns	
Turn-On Rise Time	t _r		-	9	-	ns	
Turn-Off Delay Time	td(off)		-	17	-	ns	
Turn-Off Fall Time	t _f		-	6	-	ns	
Total Gate Charge	Q _G	V _{DD} =400V,I _D =20A, V _{GS} = -5/18V	-	40	-	nC	
Gate-Source Charge	Q _{GS}		-	14	-	nC	
Gate-Drain Charge	Q _{GD}		-	12	-	nC	
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} = -5V,I _S =10A	-	3.9	-	V
Continuous Diode Forward Current		I _S	V _{GS} =0V	-	-	51	A
Reverse Recovery Time		t _{rr}	V _R =400V, I _{SD} =10A,	-	13	-	ns
Recovered charge		Q _{rr}		-	98	-	nC
Peak reverse recovery current		I _{rrm}		-	5	-	A

Notes: 1 RepetitiveRating Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%

Typical Characteristics Diagrams

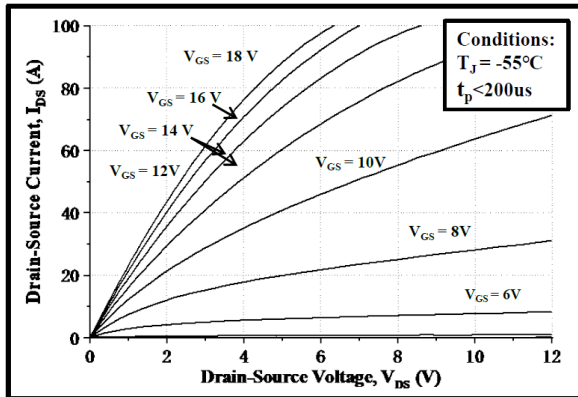


Figure 1. Output Characteristics $T_j = -55^\circ\text{C}$

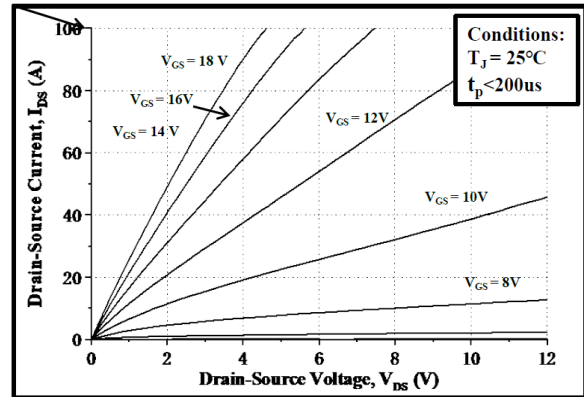


Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$

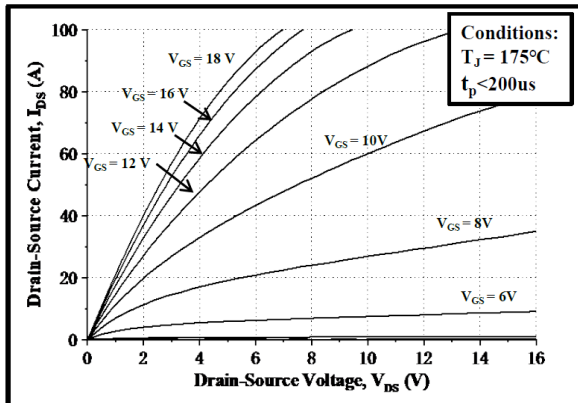


Figure 3. Output Characteristics $T_j = 175^\circ\text{C}$

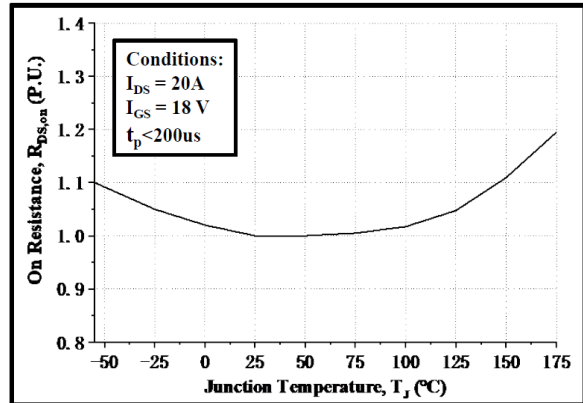


Figure 4. Normalized On-Resistance vs. Temperature

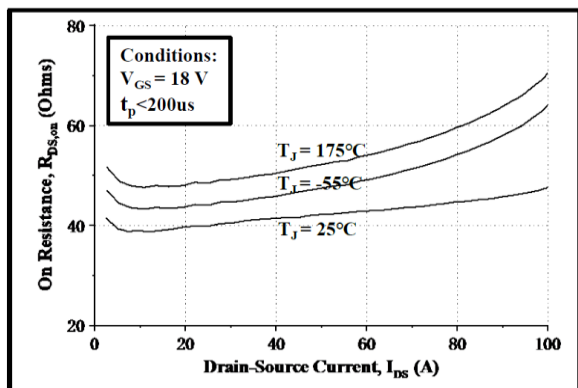


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

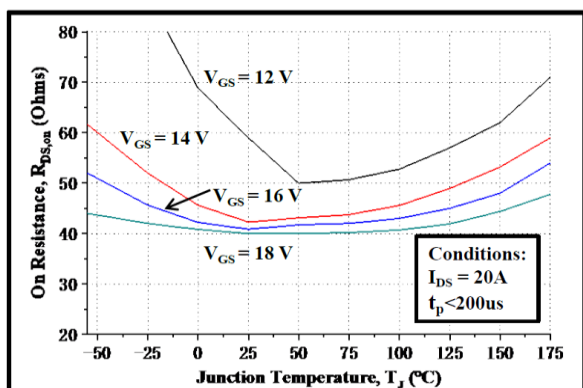


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

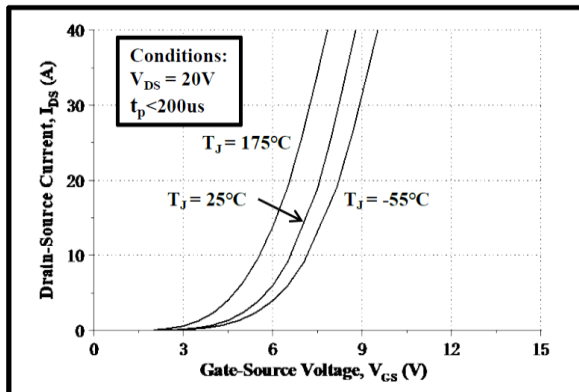


Figure 7. Transfer Characteristic for Various Junction Temperatures

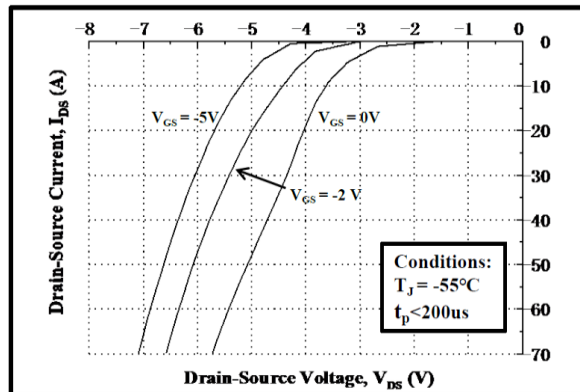


Figure 8. Body Diode Characteristic at -55°C

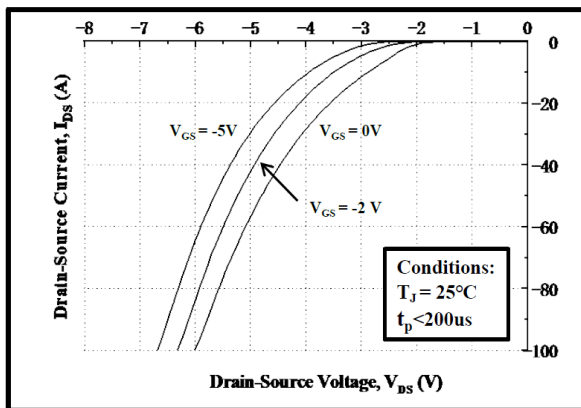


Figure 9. Body Diode Characteristic at 25°C

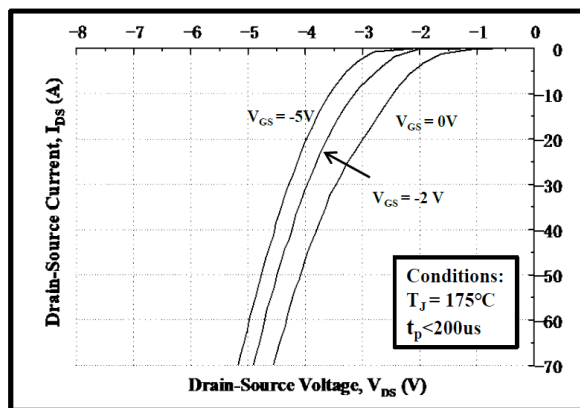


Figure 10. Body Diode Characteristic at 175°C

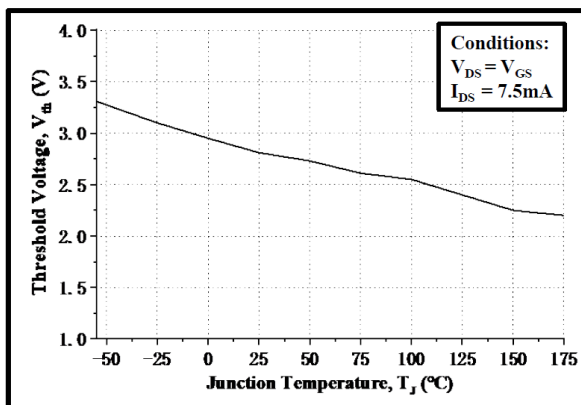


Figure 11. Threshold Voltage vs. Temperature

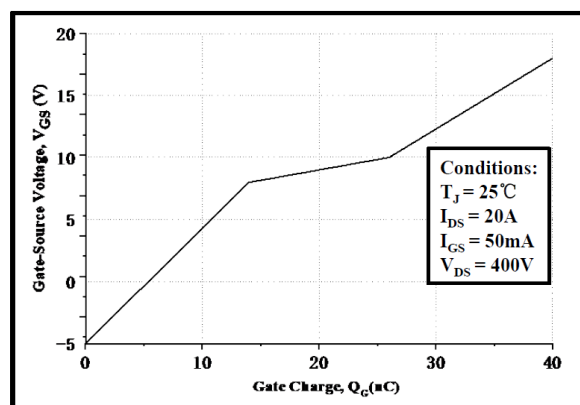


Figure 12. Gate Charge Characteristics

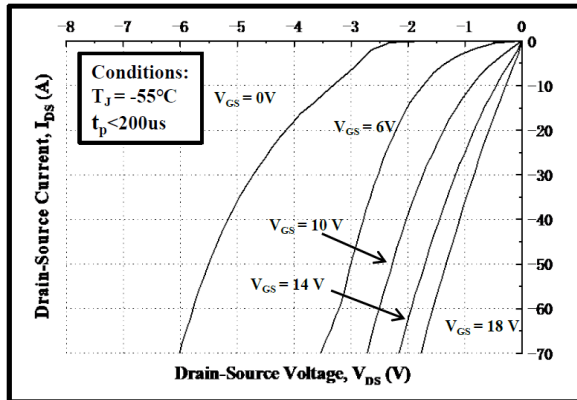


Figure 13. 3rd Quadrant Characteristic at -55°C

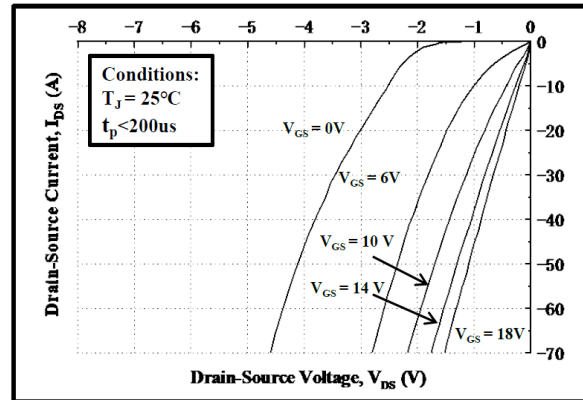


Figure 14. 3rd Quadrant Characteristic at 25°C

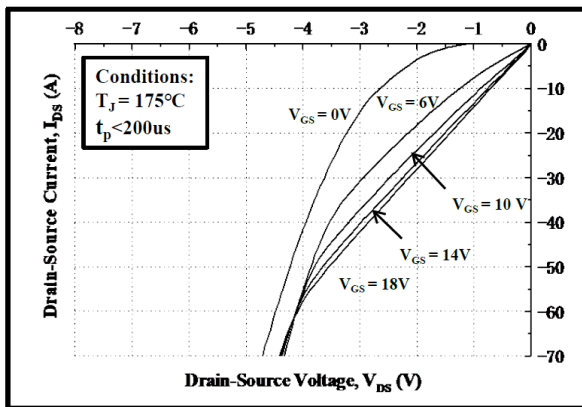


Figure 15. 3rd Quadrant Characteristic at 175 °C

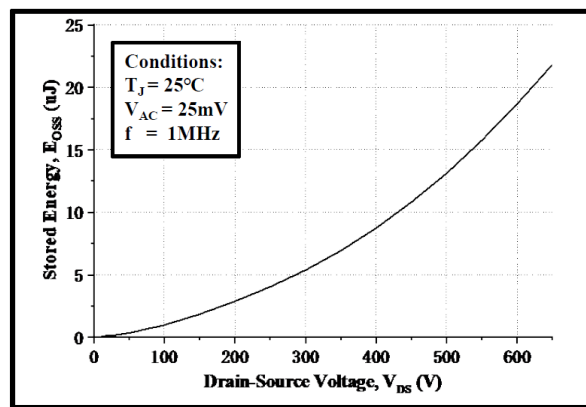


Figure 16. Output Capacitor Stored Energy

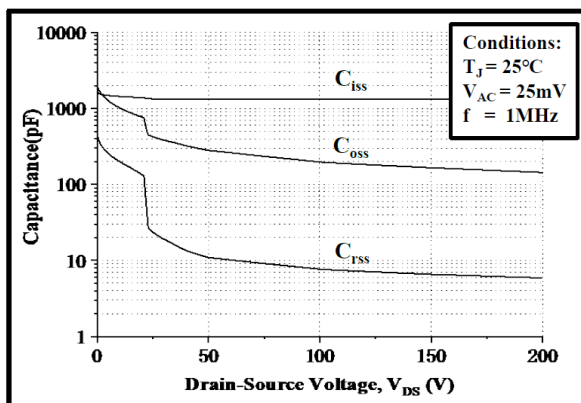


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

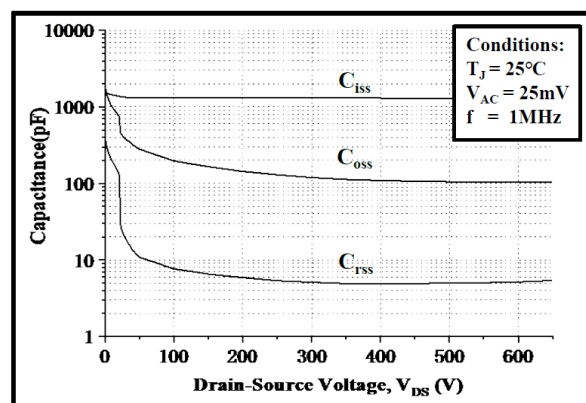


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 650V)

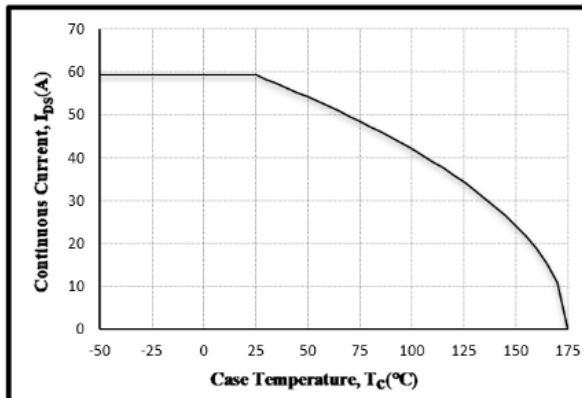


Figure 19. Continuous Drain Current Derating vs. Case Temperature

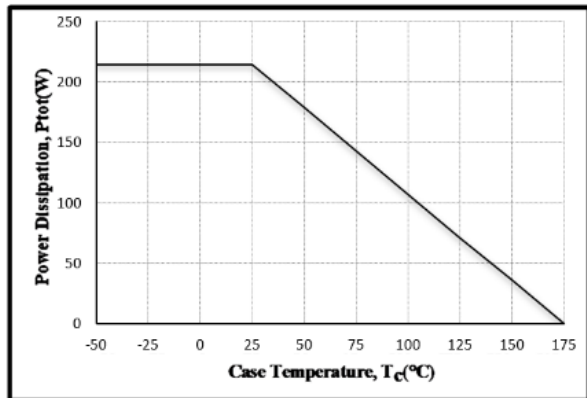


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

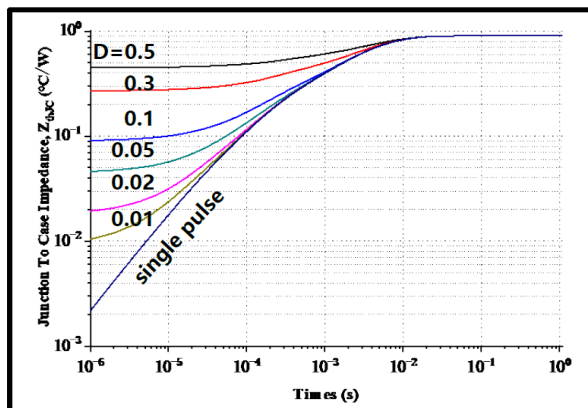


Figure 21. Transient Thermal Impedance (Junction - Case)

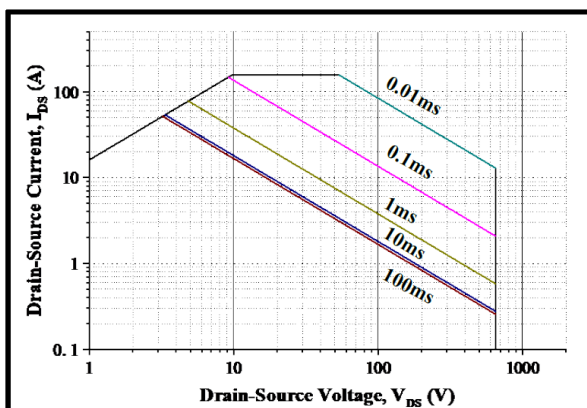
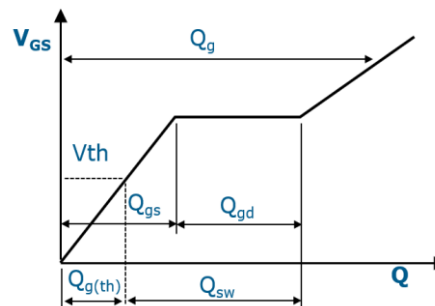
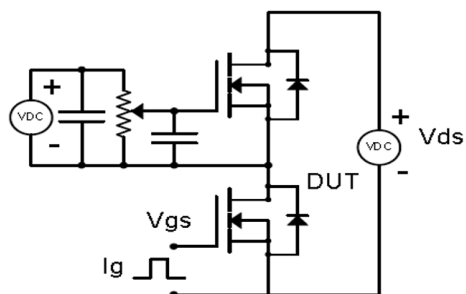


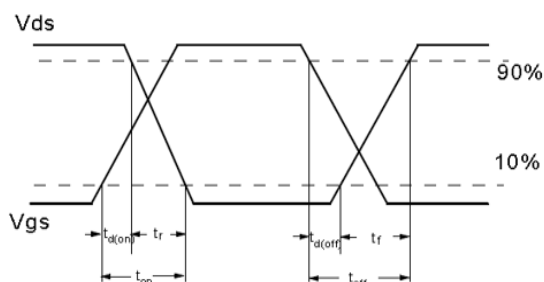
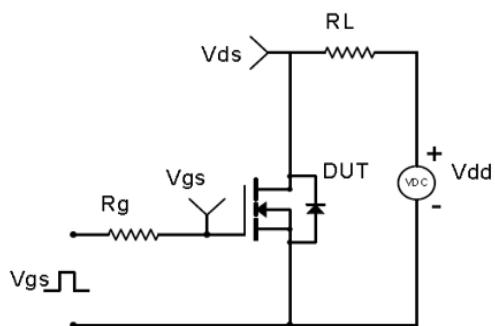
Figure 22. Safe Operating Area

Test Circuit & Waveform

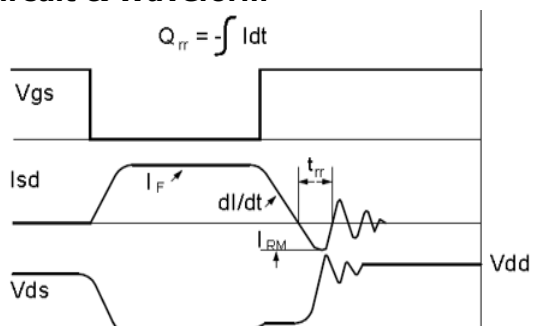
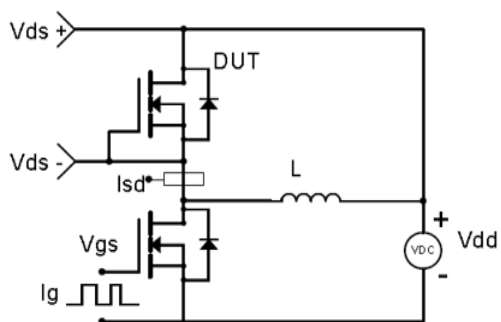
Gate Charge Test Circuit & Waveform



MOSFET Switching Test Circuit & Waveform



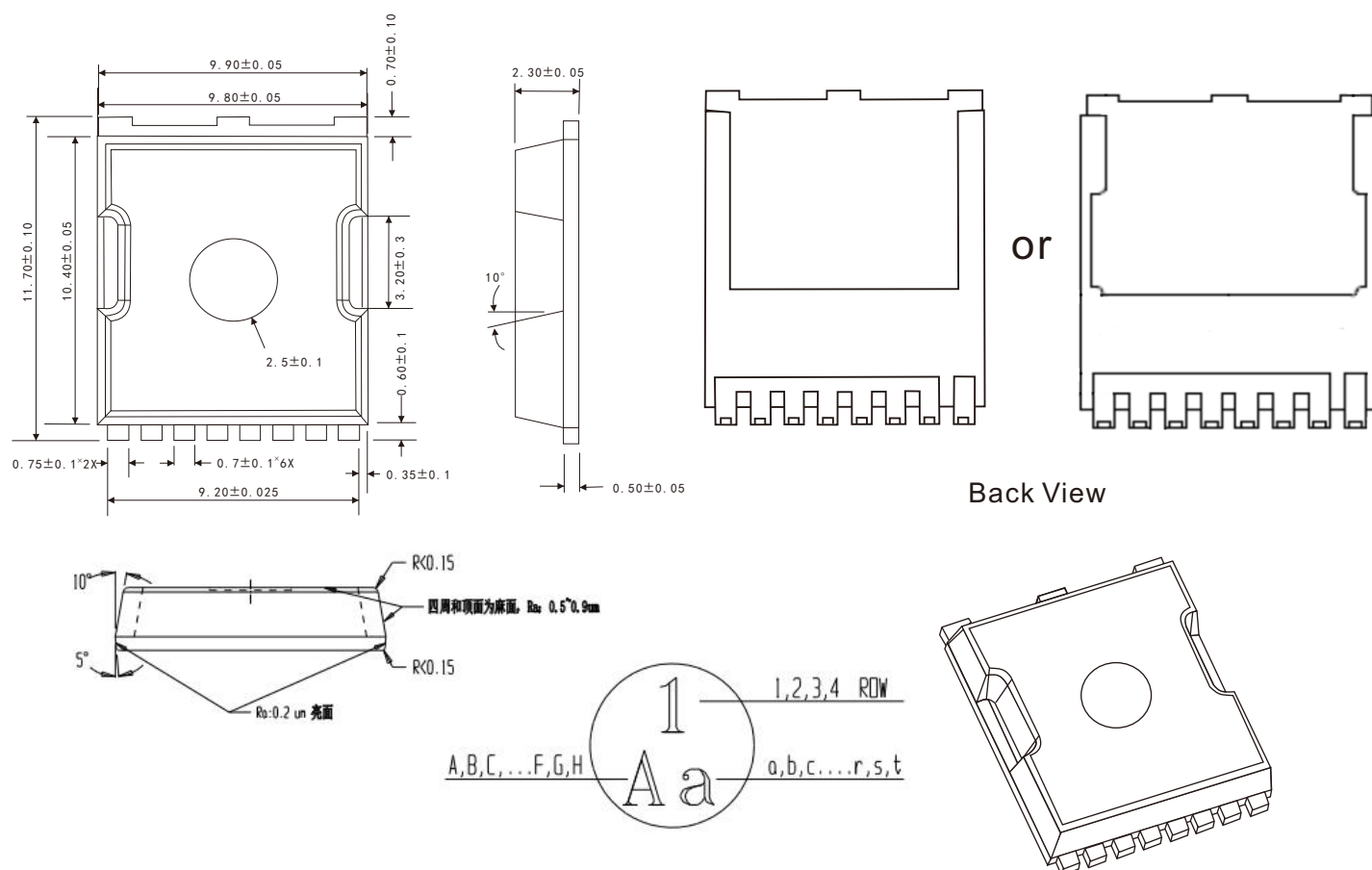
Diode Recovery Test Circuit & Waveform



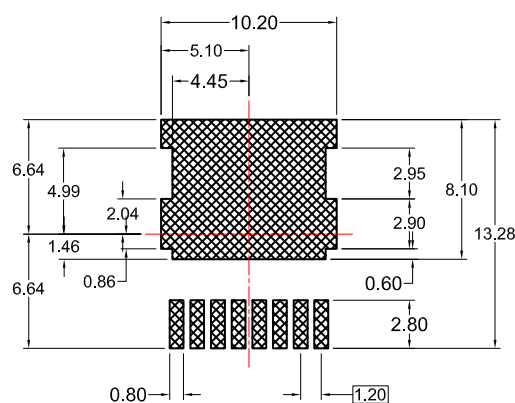
Dimensions

TOLL package

TOLL PACKAGE OUTLINE DIMENSIONS



Suggested Pad Layout



Friendship Reminder

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