

Features

- Uses advanced SGT technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)

Product Summary			
V_{DS}	$R_{DS(on)}$ (m Ω) Typ	I_D (A)	Q_g (Typ)
150V	3.3@ 10V 20A	190	110nc

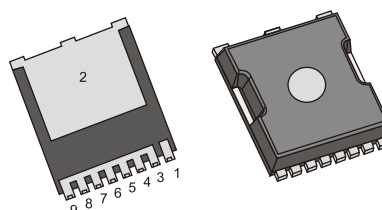
Mechanical Data

- Case:TOLL Package

TOLL
D040N15T

Application

- Motor control and drives
- Battery management
- DC/DC converter
- General purpose applications



Ordering Information

Part No.	Package Type	Package	Quality(box)
D040N15T	TOLL	Tape & Reel	2000

Block Diagram

Pin Definition:

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

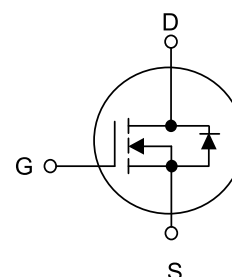


Table1 Absolute Maximum Ratings ($T_C=25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	190	A
		134	
Pulsed Drain Current (Note 1)	I_{DM}	760	A
Single Pulse Avalanche Energy	E_{AS}	2162	mJ
Power Dissipation $T_C=25^\circ\text{C}$	P_D	260	W
Operating Junction and Storage Temperature	T_J/T_{STG}	$-55\sim+150$	$^\circ\text{C}$

Table 2. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62	$^{\circ}\text{C/W}$
Thermal resistance Junction to Case	$R_{\theta JC}$	0.48	$^{\circ}\text{C/W}$

Table 3. Electrical Characteristics ($T_J=25^{\circ}\text{C}$, 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	165	-	-	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =150V,V _{GS} =0V	-	-	1	μA
Gate- Source Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
On Characteristics(Note 2)						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} ,I _D =250μA	2.0	3.0	4.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V,I _D =20A	-	3.3	4.0	mΩ
Dynamic Characteristics(Note 3)						
Input Capacitance	C _{ISS}	V _{DS} =75V,V _{GS} =0V,f=1MHz	-	9689	-	pF
Output Capacitance	C _{OSS}		-	833	-	pF
Reverse Transfer Capacitance	C _{RSS}		-	257	-	pF
Switching Characteristics (Note 3)						
Turn-On Delay Time	td(on)	V _{DD} =75V V _{GS} =10V,R _G =4.7Ω,	-	32	-	ns
Turn-On Rise Time	tr		-	41	-	ns
Turn-Off Delay Time	td(off)		-	70	-	ns
Turn-Off Fall Time	tf	V _{DS} =75V,I _D =20A, V _{GS} = 10V	-	16	-	ns
Total Gate Charge	Q _G		-	110	-	nC
Gate-Source Charge	Q _{GS}		-	38	-	nC
Gate-Drain Charge	Q _{GD}		-	25	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.2	V
Reverse Recovery Time	trr	I _F =40A	-	106	-	ns
Reverse Recovery Charge	Q _{RR}	dI _F /dt=500A/μs	-	272	-	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width $\leq 300\mu s$, Duty cycles $\leq 2\%$

3 Guaranteed by design, not subject to production

Typical Characteristics Diagrams

Figure 1. Output Characteristics

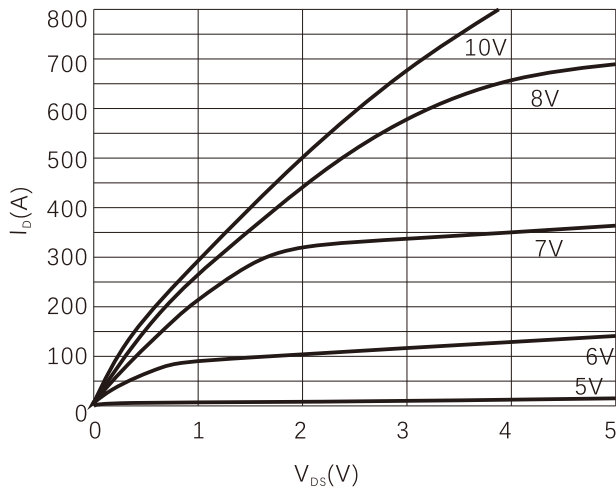


Figure 2. Normalized $R_{DS(on)}$ vs Temperature

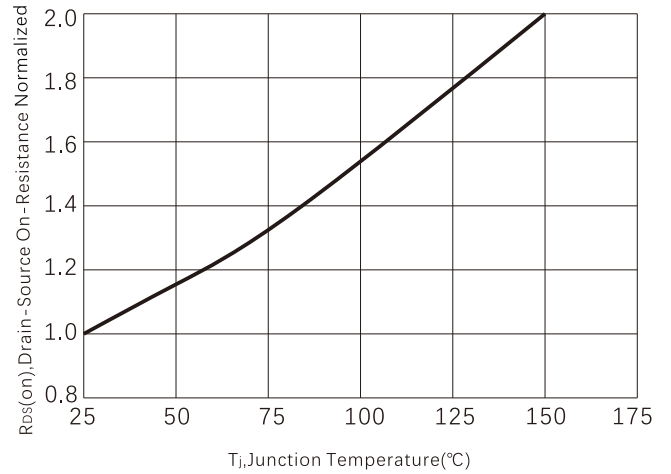


Figure 3. On-Resistance vs. Drain Current

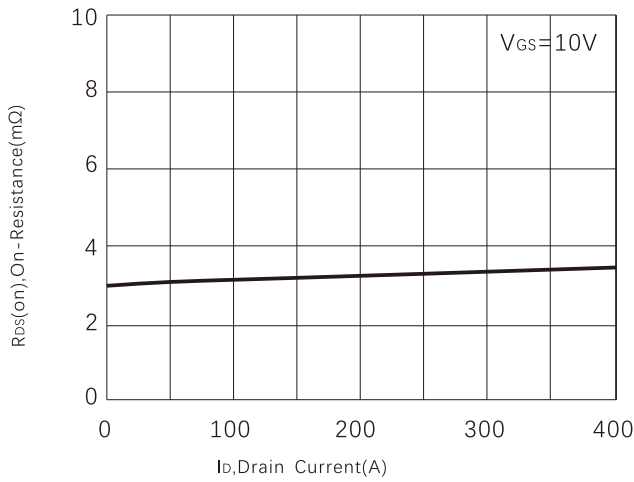


Figure 4. Capacitance

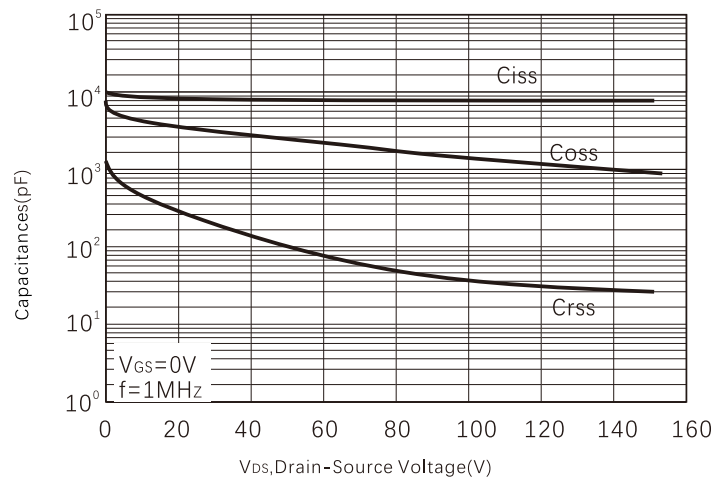


Figure 5. Gate charge

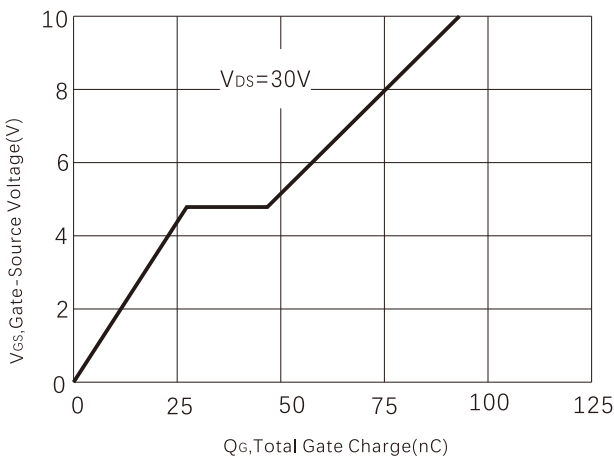


Figure 6. Source-Drain Diode Forward Voltage

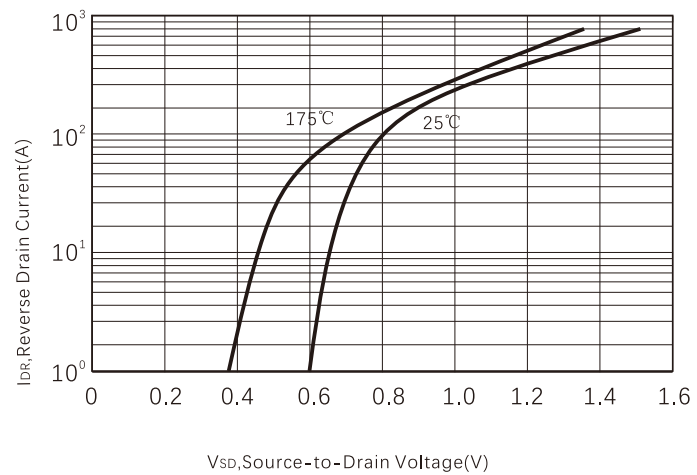


Figure7.Maximum Drain Current vs Temperature

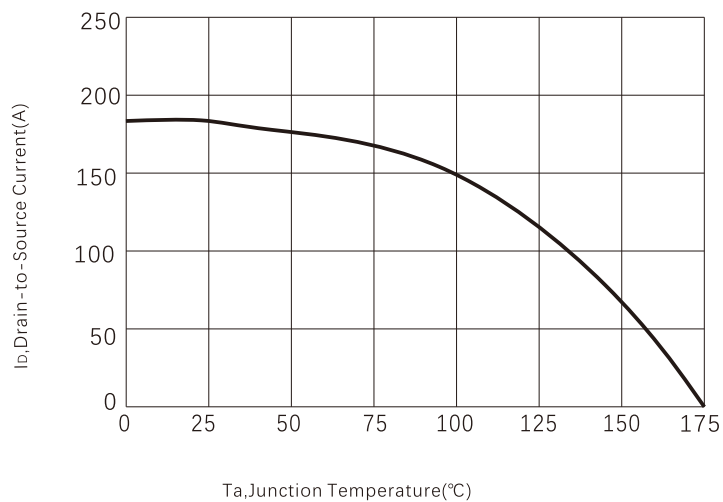


Figure 8. Transfer Characteristics

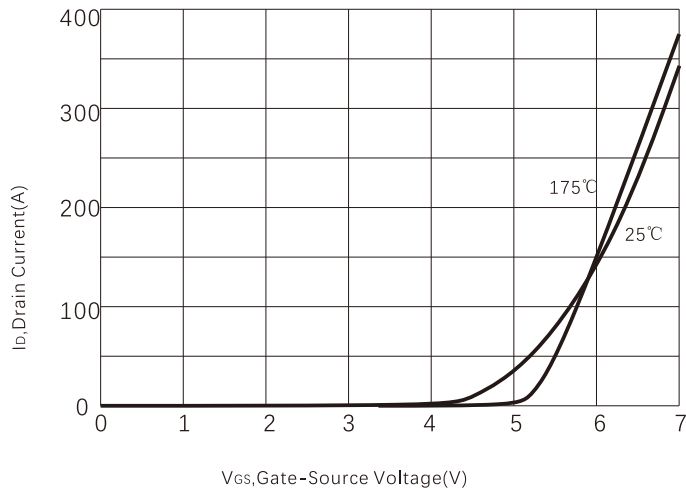


Figure 9. Safe operating area

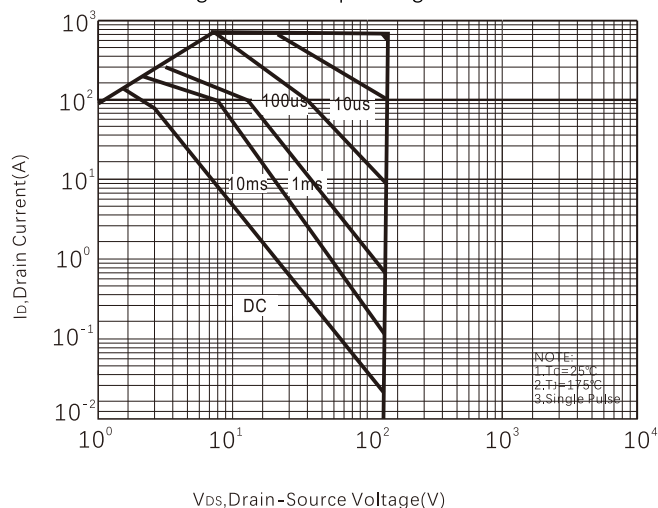
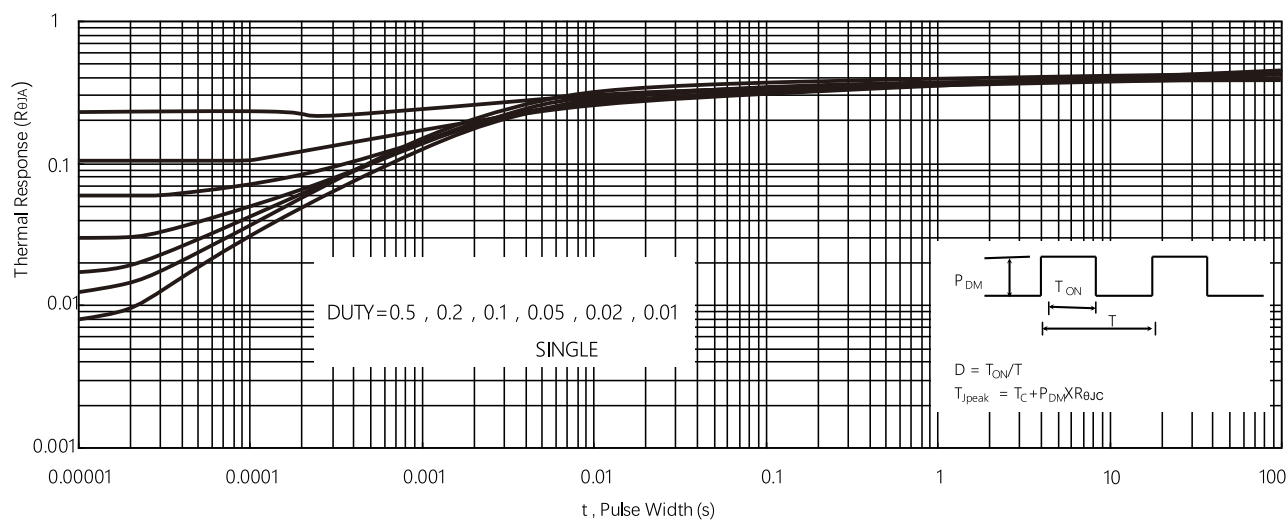
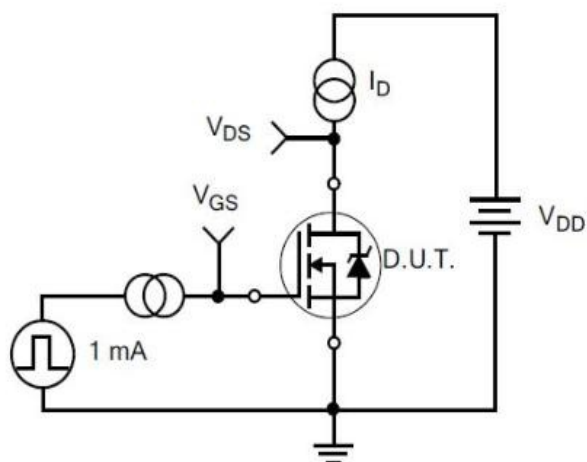


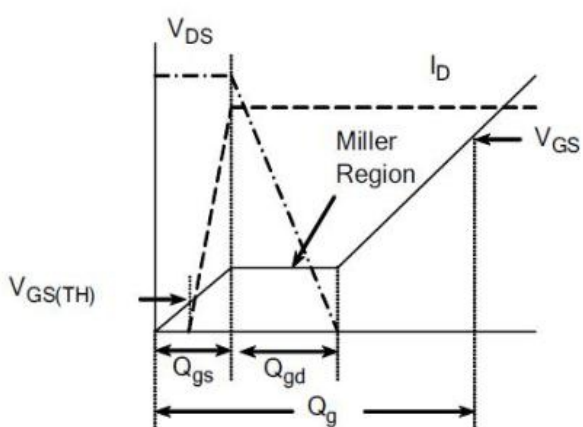
Figure 10. Maximum Transient Thermal Impedance



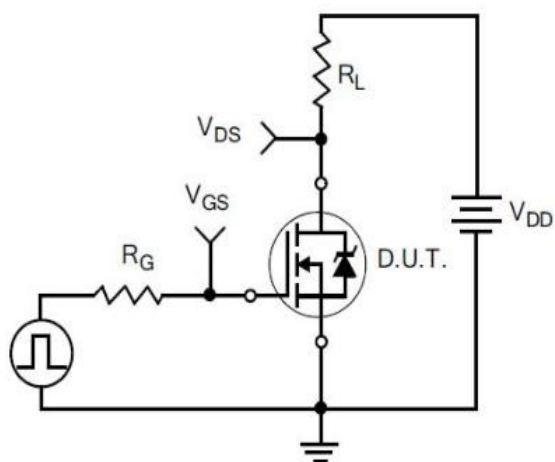
Typical Test Circuit



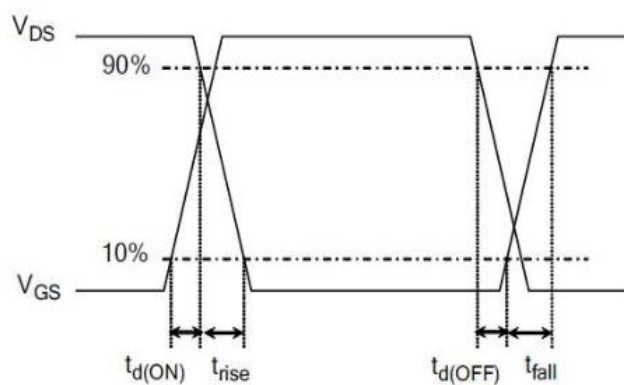
1) Gate Charge Test Circuit



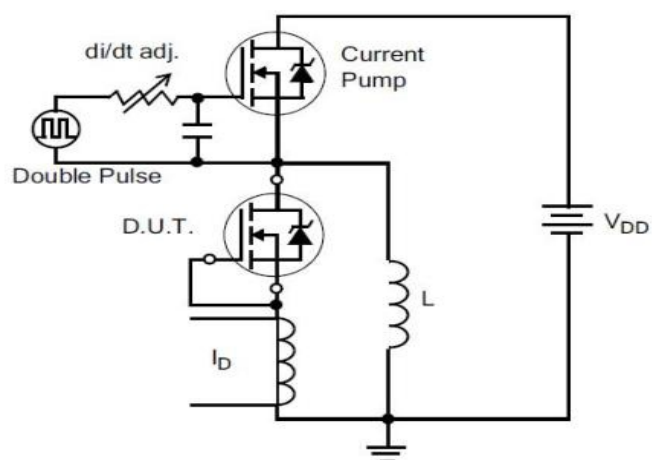
2) . Gate Charge Waveform



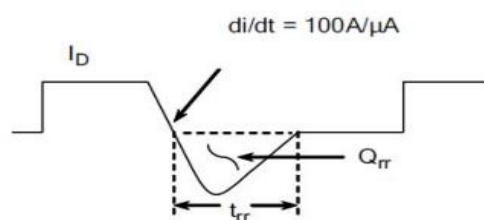
3) Resistive Switching Test Circuit



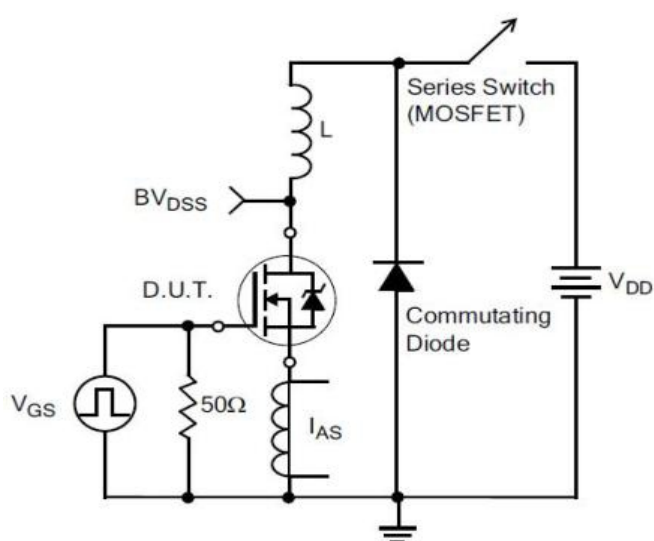
4) Resistive Switching Waveforms



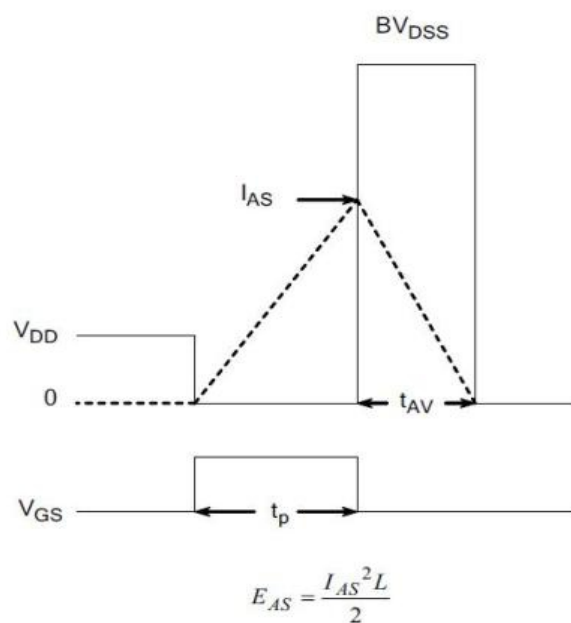
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

Product Names Rules

X X X N E X X X-X X X

Process Type:
VDMOS:default
Super junction:SJ
Low Voltage trench:D

Rdson Code
2 Ω :2D0
9.5m Ω :9M5

Rated Current Code
With 3 Digital,
For Ex ample:
6.7mΩ:067,
10mΩ:100,

Package Code
TO-220:Default
ITO-220:F
TO-262:E
TO-263:D
TO-252:M
TO-251:N
TO-263-7L:D7
TOLL:T

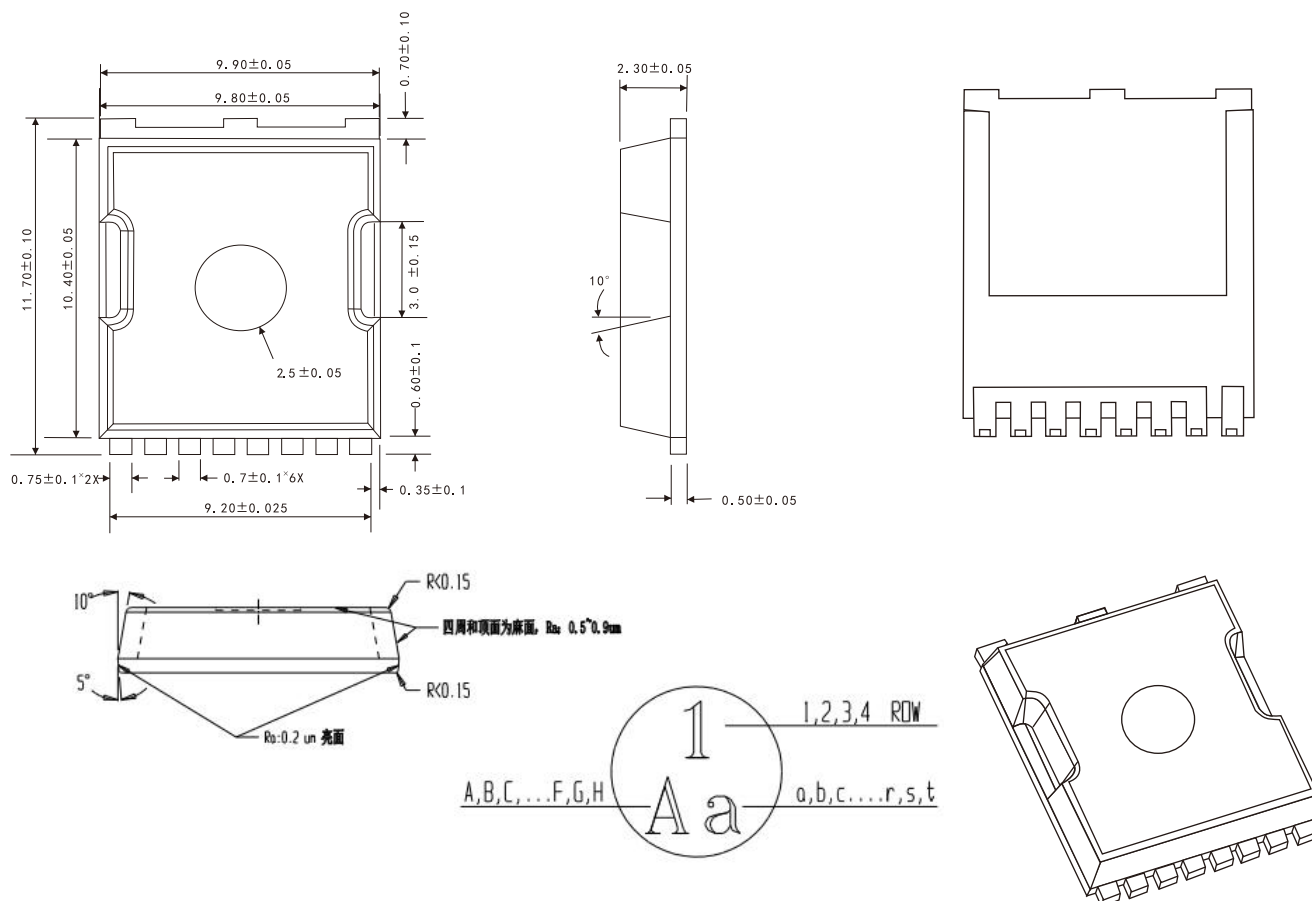
Rated Voltage Code
With 2 Digital,For Example:
600V:60
60V:06

Channel Code
N channel:N
P channel:P

Special Function Code
G-S ESD Protection:E
No Protection:Default

Dimensions

TOLL PACKAGE OUTLINE DIMENSIONS



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