

Features

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

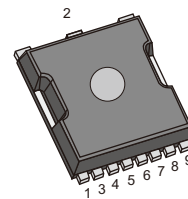
Product Summary			
V_{DS}	$R_{DS(on)}$ (m Ω) Typ	I_D (A)	Q_g (Typ)
40V	0.28@ 10V 60A	1100	279nc

Mechanical Data

- Case:TOLL Package

TOLL

DS0028N04T



Application

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

Ordering Information

Part No.	Marking.	Package Type	Package	Quantity(box)
DS0028N04T	DS0028N04T	TOLL	Tape & Reel	2000

Block Diagram

Pin Definition:

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

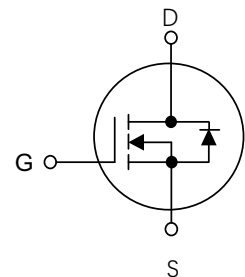


Table1 Absolute Maximum Ratings (Tc=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Note 1) $T_c=25^\circ\text{C}$	I_D	1100	A
Pulsed Drain Current (Note 2)	I_{DM}	4400	
Avalanche Current	I_{AS}	112	A
Single Pulse Avalanche Energy(Note 3)	E_{AS}	627	mJ
Power Dissipation $T_c=25^\circ\text{C}$	P_D	961	W
Operating Junction and Storage Temperature	T_J/T_{STG}	-55~+150	$^\circ\text{C}$

Table 2. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance Junction to Ambient. Max	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$
Thermal resistance Junction to Case. Max	$R_{\theta JC}$	0.13	$^{\circ}\text{C}/\text{W}$

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	40	-	-	V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =40V,V _{GS} =0V	-	-	1	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =20V,V _{DS} =0V	-	-	100	nA
	Reverse		V _{GS} = -20V,V _{DS} =0V	-	-	-100	nA
On Characteristics(Note 4)							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} ,I _D =250μA	2.0	-	4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V,I _D =60A	-	0.28	0.6	mΩ
Dynamic Characteristics(Note 5)							
Input Capacitance		C _{ISS}	V _{DS} =20V,V _{GS} =0V,f=100KHz	-	20590	-	pF
Output Capacitance		C _{OSS}		-	6938	-	pF
Reverse Transfer Capacitance		C _{RSS}		-	247	-	pF
Switching Characteristics (Note 5)							
Turn-On Delay Time		td(on)	V _{DS} =20V,I _D =60A V _{GS} =10V,R _G =3Ω,	-	62	-	ns
Turn-On Rise Time		tr		-	138	-	ns
Turn-Off Delay Time		td(off)		-	216	-	ns
Turn-Off Fall Time		tf	V _{DS} =20V,I _D =60A, V _{GS} =10V	-	132	-	ns
Total Gate Charge		Q _G		-	279	-	nC
Gate-Source Charge		Q _{GS}		-	88	-	nC
Gate-Drain Charge		Q _{GD}		-	26	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V,I _S =60A	-	-	1.2	V
Reverse Recovery Time		trr	I _F =60A,dI _F /dt=100A/μs	-	58	-	ns
Reverse Recovery Charge		Q _{RR}	I _F =60A,dI _F /dt=100A/μs	-	40	-	nC

- Notes: 1 The maximum current rating is package limited.
 1 Repetitive Rating:Pulse width limited by maximum junction temperature
 2 $L=0.1\text{mH}$, $V_{GS}=10V$, $R_G=25\Omega$, $V_{DD}=40V$, Starting $T_J=25^{\circ}\text{C}$
 3 Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
 4 Guaranteed by design, not subject to production

Typical Characteristics Diagrams

Figure 1. Output Characteristics

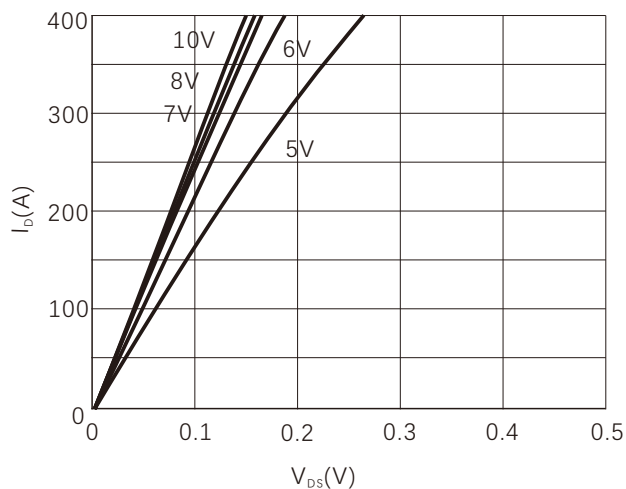


Figure 2. Transfer Characteristics

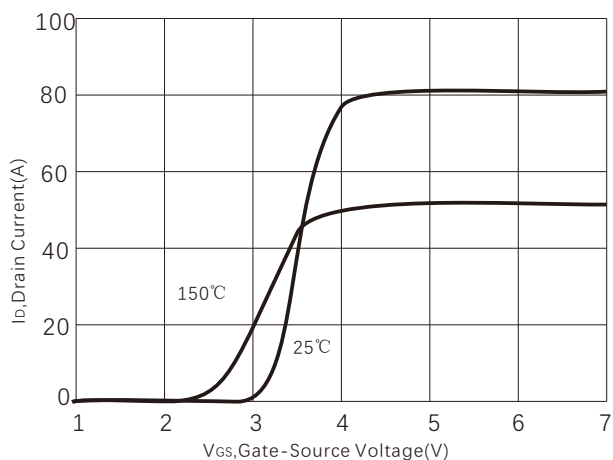


Figure 3. On-Resistance vs. Drain Current

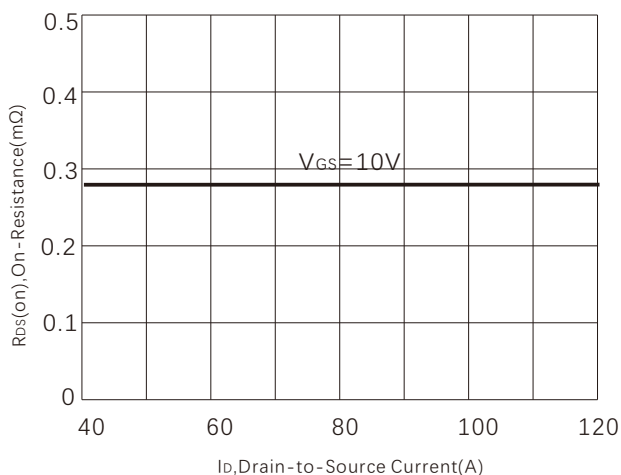


Figure 4. Capacitance

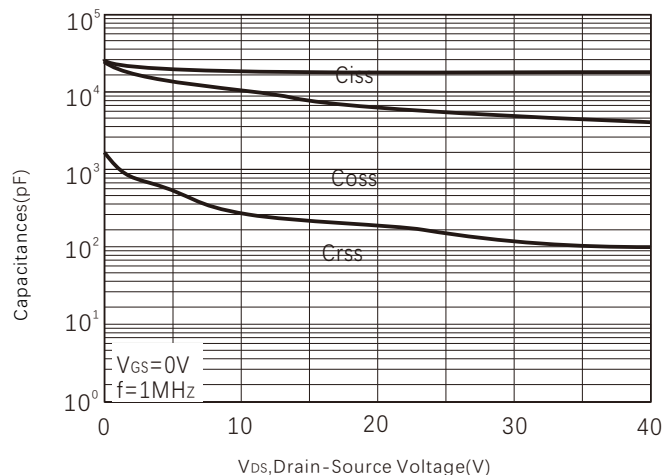


Figure 5. Gate charge

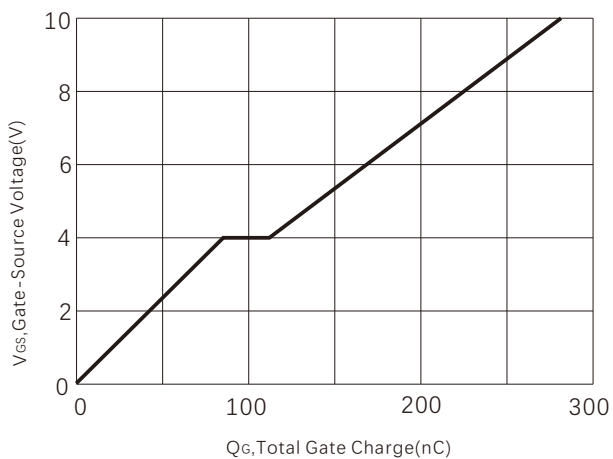


Figure 6. Source-Drain Diode Forward Voltage

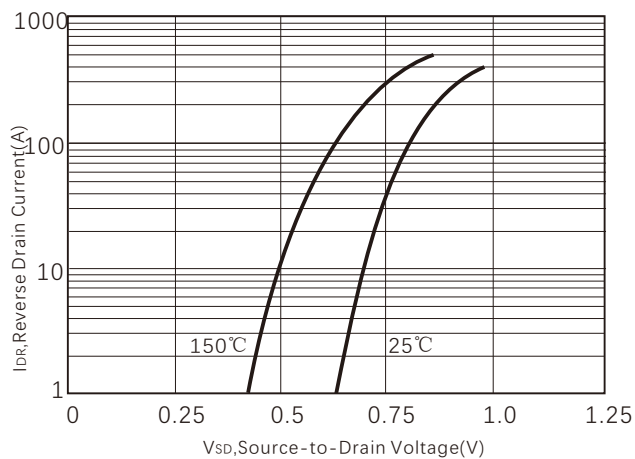


Figure7.Maximum Drain Current vs Temperature

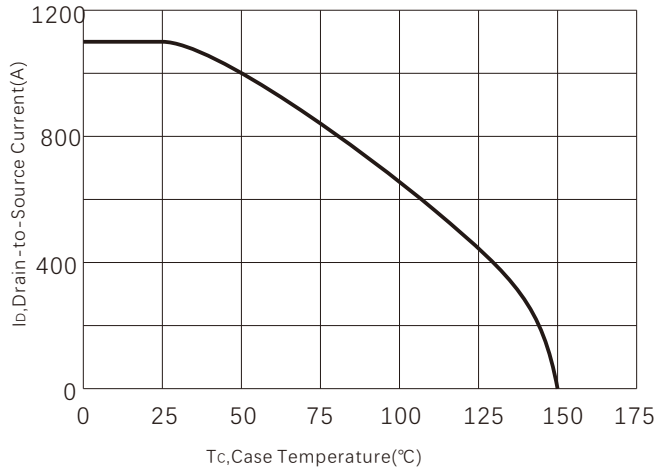


Figure 8. Power dissipation

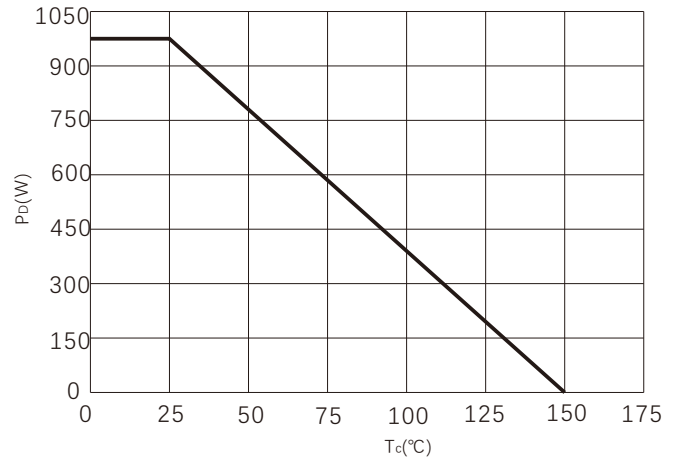


Figure 9.

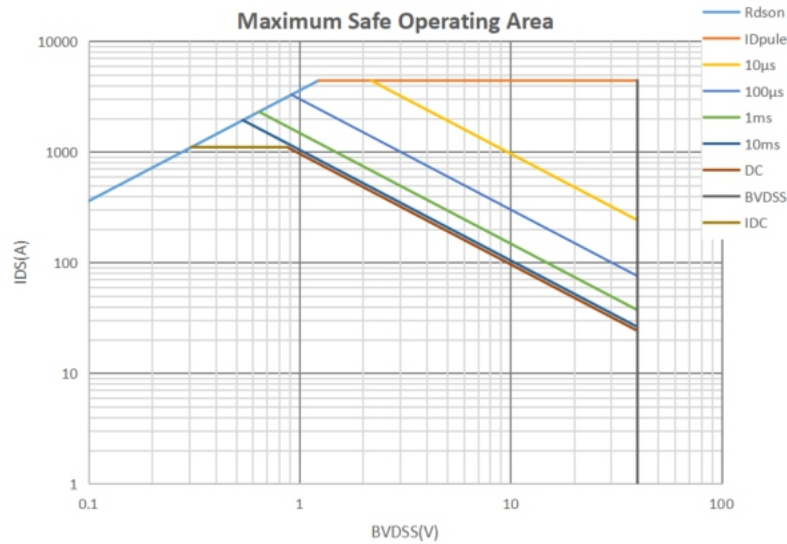
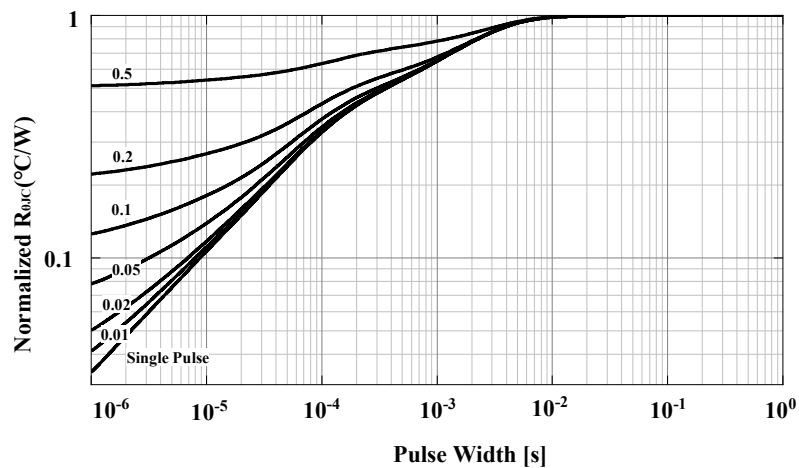
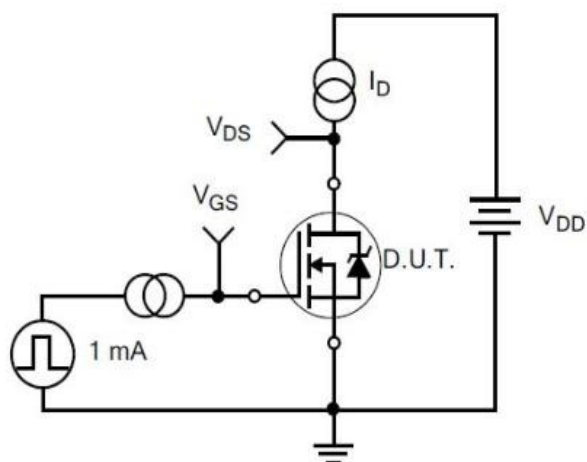


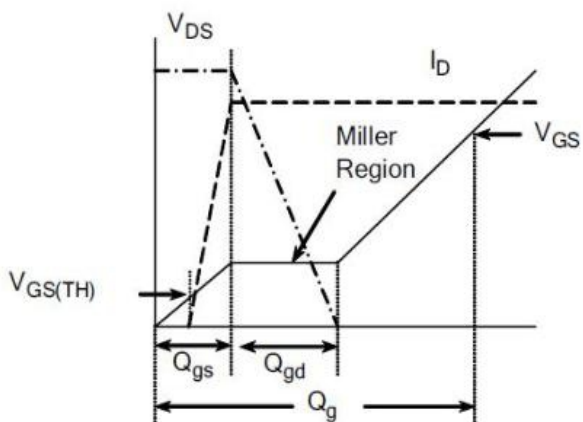
Figure 10.Normalized Maximum Transient Thermal Impedance



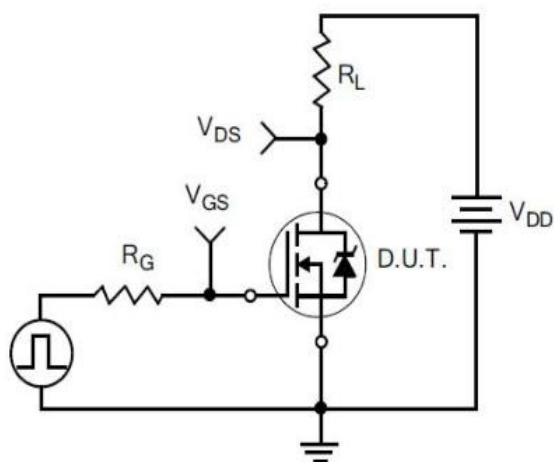
Typical Test Circuit



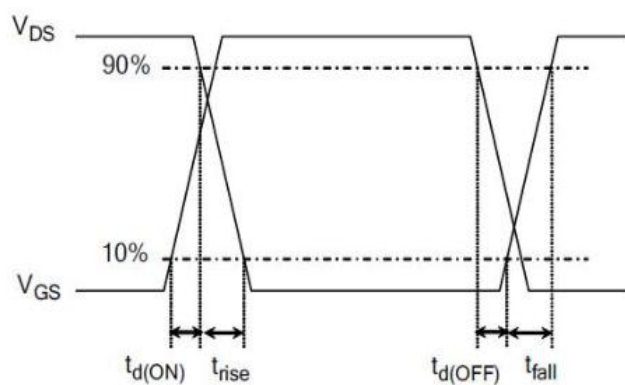
1) Gate Charge Test Circuit



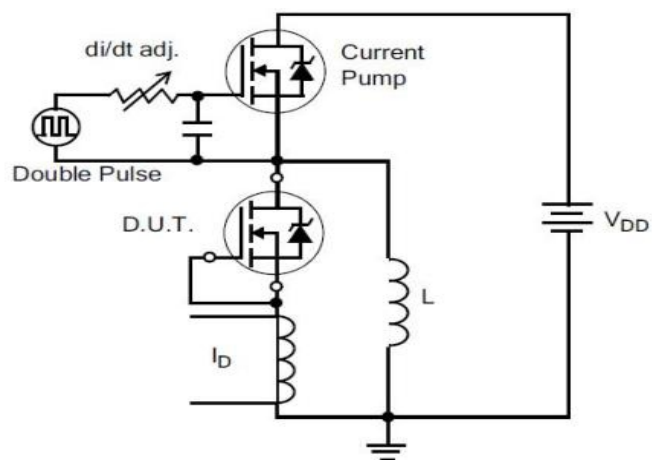
2) . Gate Charge Waveform



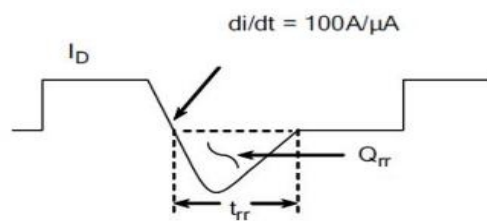
3) Resistive Switching Test Circuit



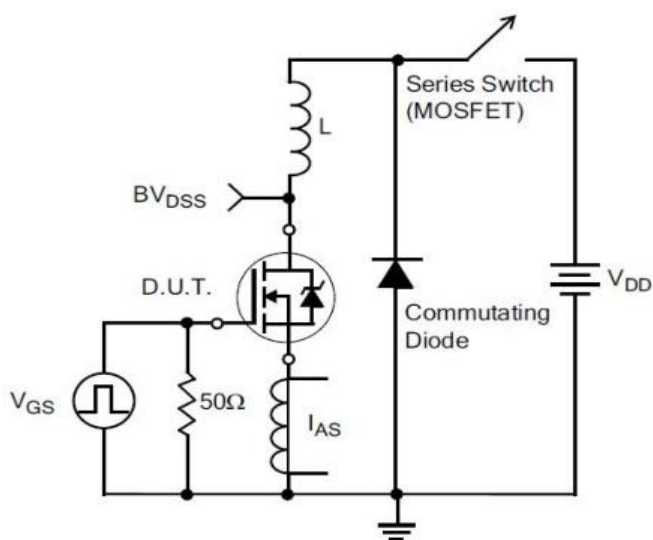
4) Resistive Switching Waveforms



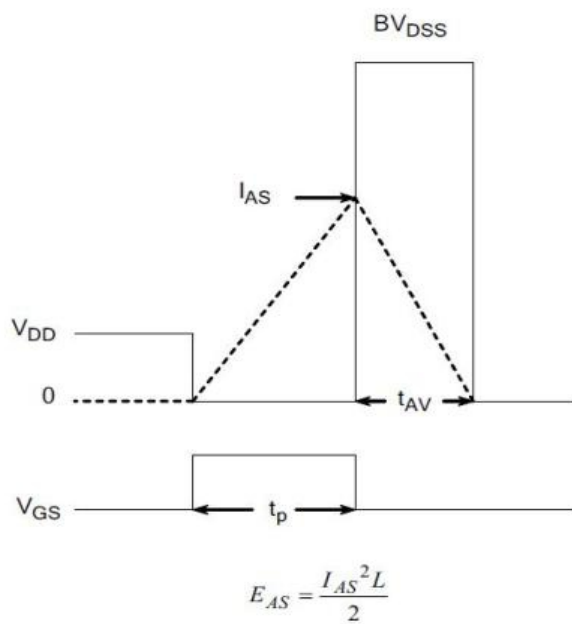
5) Diode Reverse Recovery Test Circuit



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
Low Voltage SGT:DS

Rdson Code
2Ω:2D0
9.5mΩ:9M5

Rated Current Code
With 2-4 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

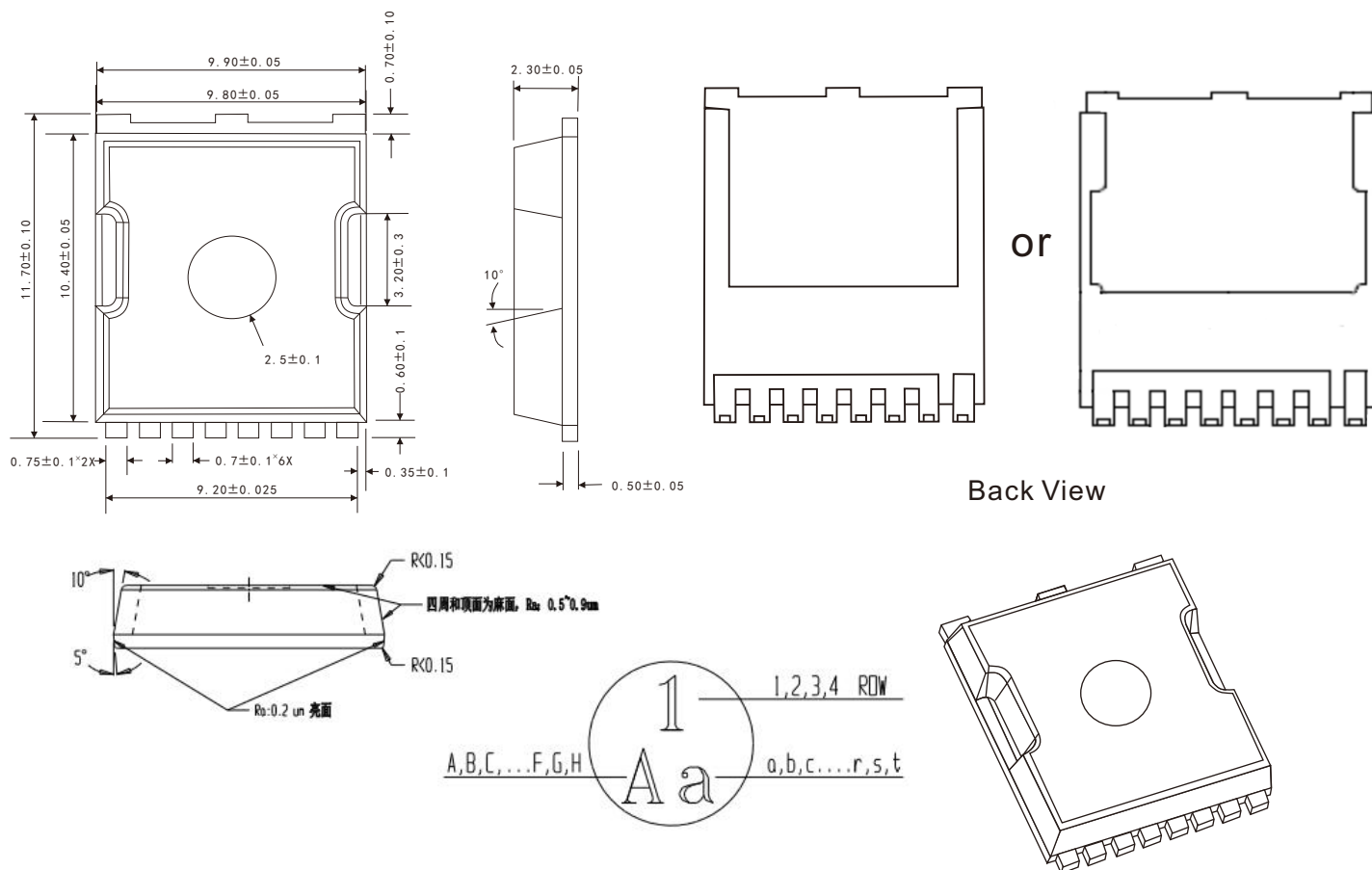
Rated Voltage Code
With 2 Digital,For Example:
600V:60
60V:06

Channel Code
N channel:N
P channel:P

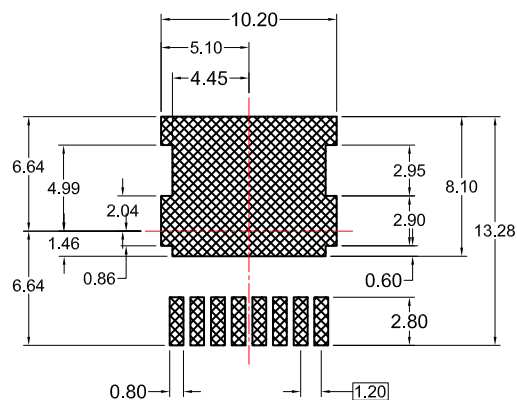
Special Function Code
G-S ESD Protection:E
No Protection:Default

Dimensions

TOLL PACKAGE OUTLINE DIMENSIONS



Suggested Pad Layout



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