

Features

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

Application

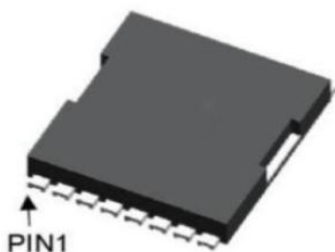
- Motor control and drive
- Battery management
- DC/DC

Product Summary

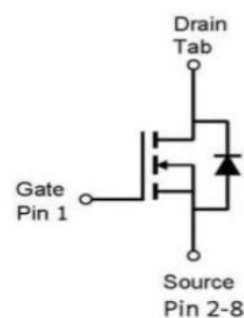
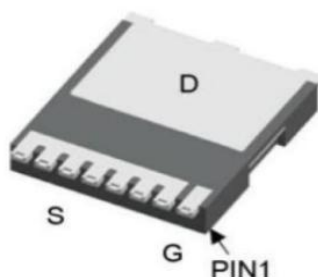
Package	TOLL
V_{DS}	40V
$R_{DS(on)}$ @ $V_{GS}=10V$	0.85mΩ
I_D	395A

Package Marking

TOLL Top View



TOLL Bottom View



Type	Package	Marking	Reel Size	Tape Width	Packing	Qty
LR010N04SD10	TOLL	LR010N04SD10	330*28.5mm	24mm	Reel&Tape	2000

Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous drain current $T_c=25^\circ\text{C}$ (Silicon limit) $T_c=100^\circ\text{C}$ (Silicon limit)	I_D	395 250	A
Pulsed Drain Current	I_{DM}	1580	A
Maximum Power Dissipation	P_d	272	W
Single pulse avalanche energy	E_{AS}	1369	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance,Junction-to-Case	R_{thJC}	0.46	°C/W
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Electrical Characteristics (T_c=25°C unless otherwise noted)

Parameter	Symbol	Condition	min	typ	max	Unit
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Static Characteristic

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V$	-	-	1	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	±100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D=30A, V_{GS}=10V$	-	0.85	1.0	mΩ
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=100A$	-	312	-	S

Dynamic Characteristic

Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V,$ $f=1MHz$	-	7120	-	pF
Output Capacitance	C_{oss}		-	3429	-	
Reverse Transfer Capacitance	C_{rss}		-	270	-	
Gate resistance	R_g	$f=1MHz$	-	2	-	Ω
Gate Total Charge	Q_G	$V_{DS}=20V, I_D=100A,$ $V_{GS}=10V$	-	112	-	nC
Gate-Source charge	Q_{gs}		-	41	-	
Gate-Drain charge	Q_{gd}		-	19	-	
Turn-on delay time	$t_{d(on)}$	$V_{GS}=10V, V_{DS}=20V,$ $R_G=1.6\Omega$	-	32	-	ns
Rise time	t_r		-	65	-	
Turn-off delay time	$t_{d(off)}$		-	75	-	
Fall time	t_f		-	40	-	

Body Diode Characteristic

Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=20A$	-	-	1.2	v
Reverse Recovery Time	t_{rr}	$I_F = 20A$ $di/dt = 100A/\mu s$	-	68	-	ns
Reverse Recovery Charge	Q_{rr}		-	120	-	nC

Typical Performance Characteristics

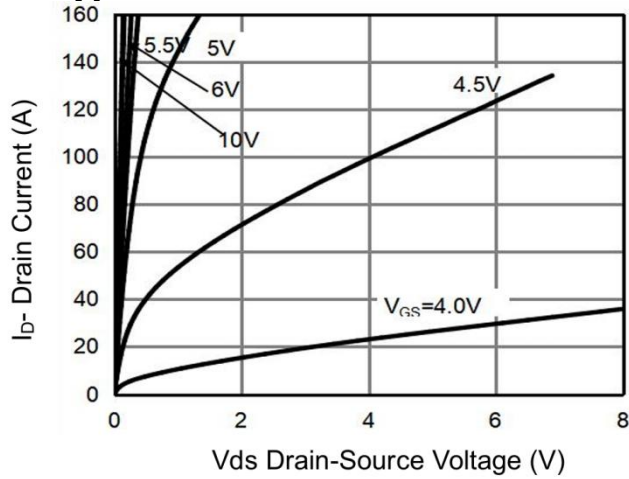


Figure 1 Output Characteristics

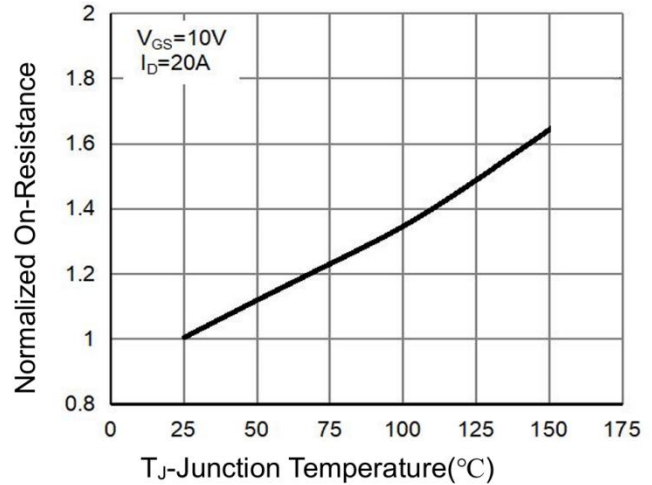


Figure 4 Rdson-Junction Temperature

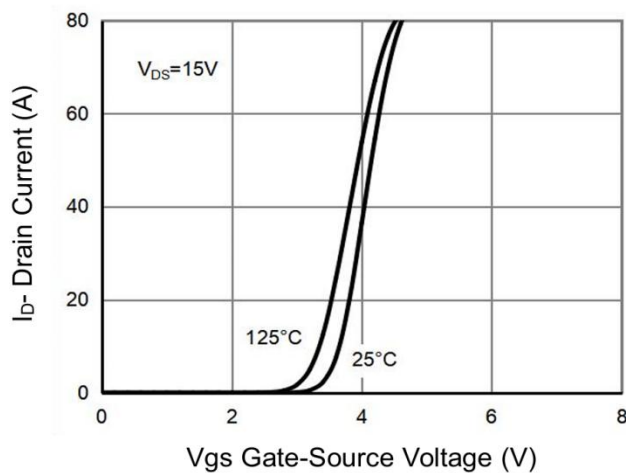


Figure 2 Transfer Characteristics

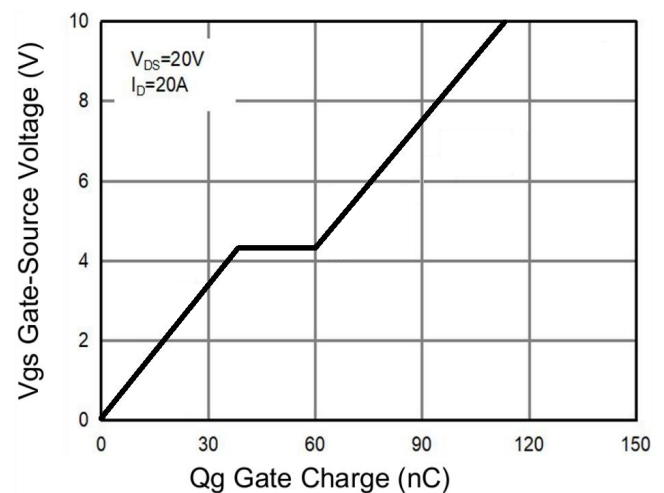


Figure 5 Gate Charge

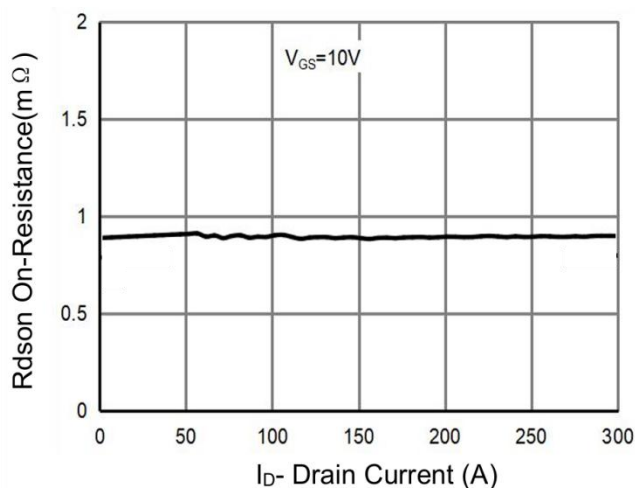


Figure 3 Rdson- Drain Current

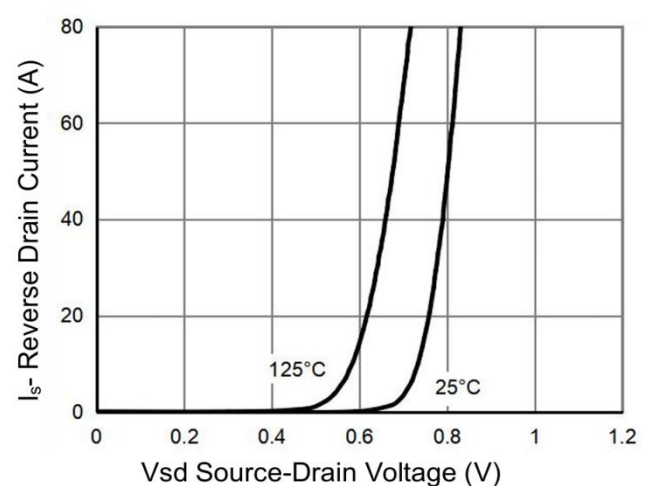


Figure 6 Source- Drain Diode Forward

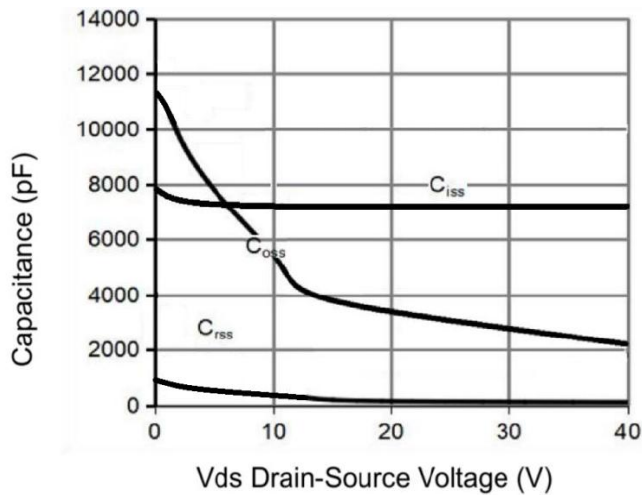


Figure 7 Capacitance vs Vds

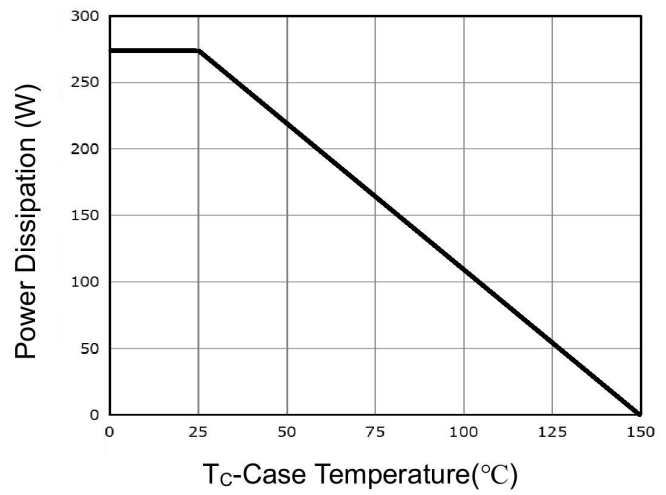


Figure 9 Power De-rating

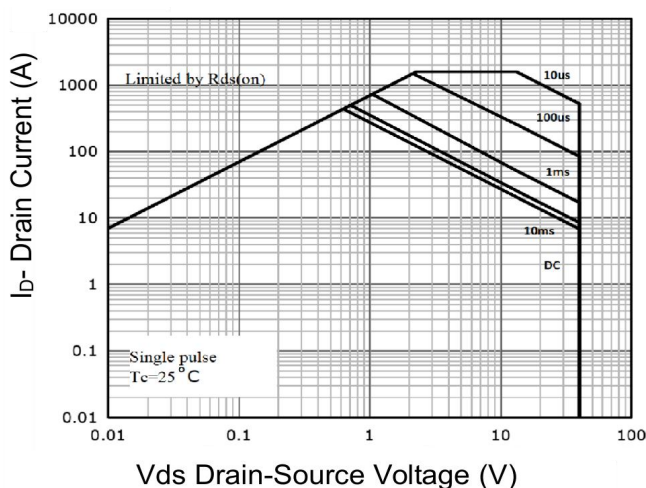


Figure 8 Safe Operation Area

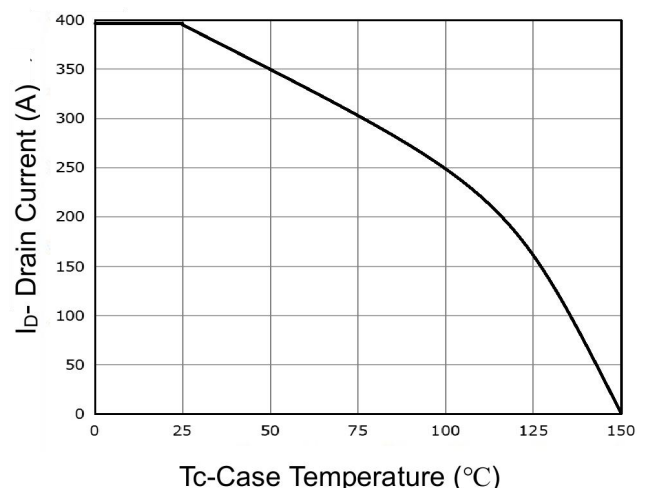


Figure 10 Current De-rating

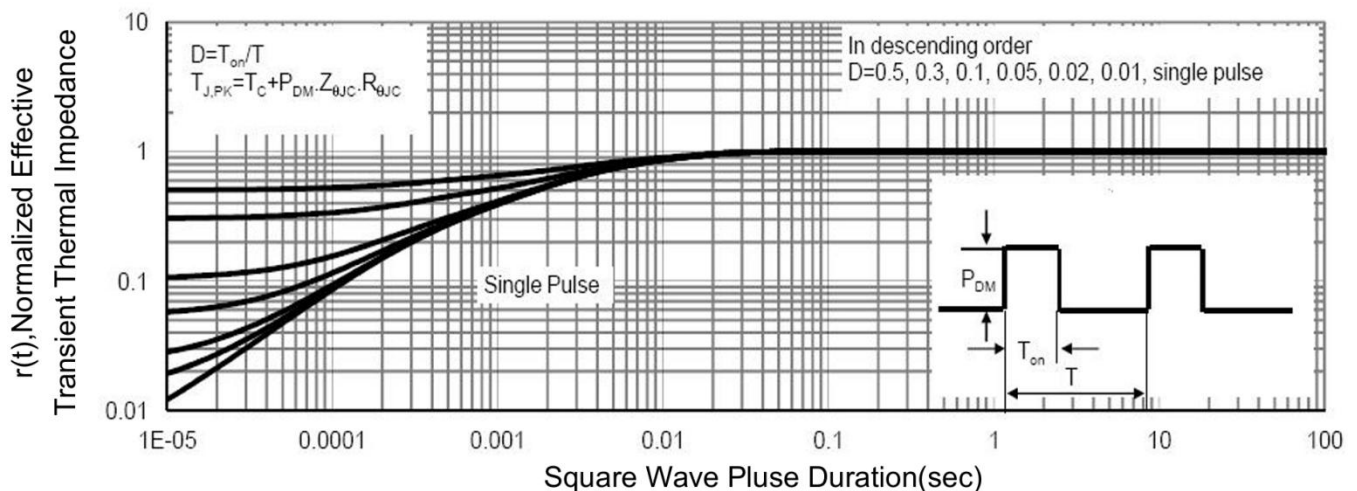
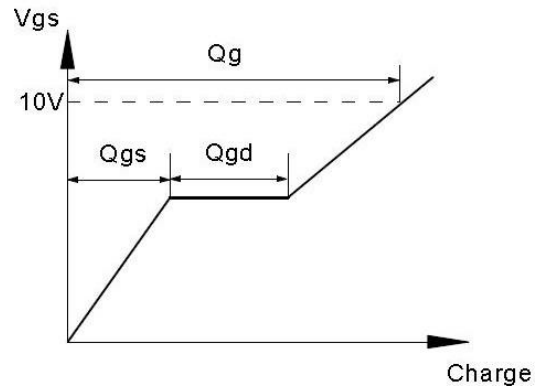
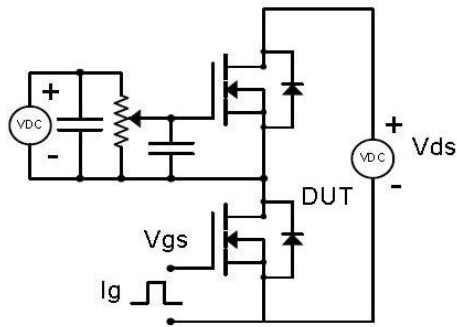


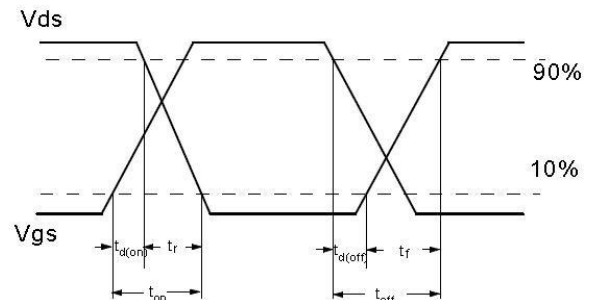
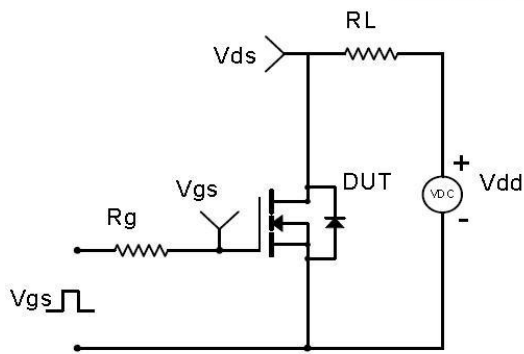
Figure 11 Normalized Maximum Transient Thermal Impedance

Test Circuit & Waveform

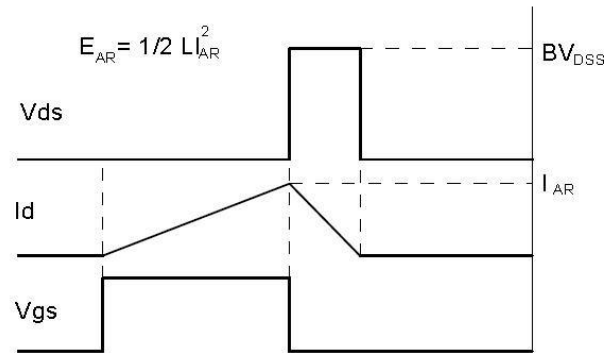
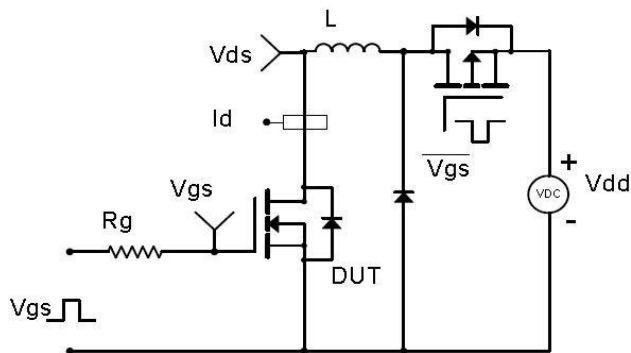
Gate Charge Test Circuit & Waveform



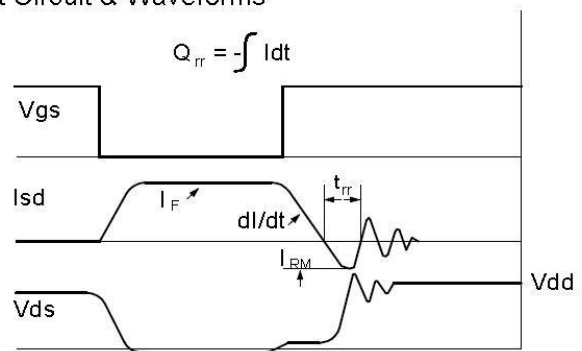
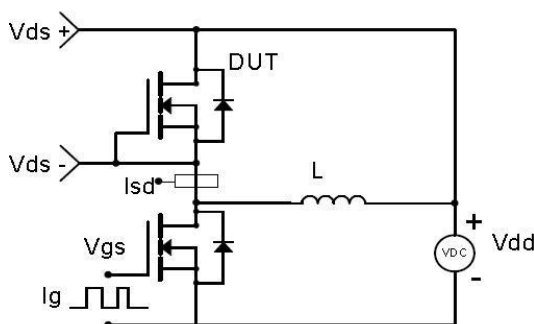
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

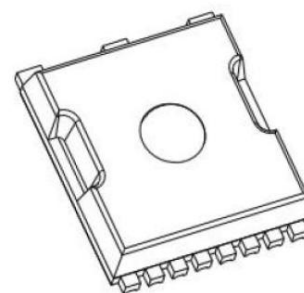
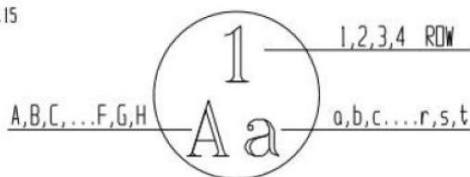
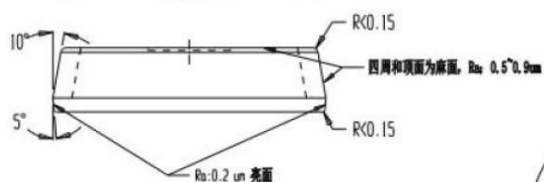
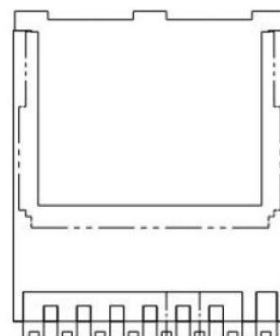
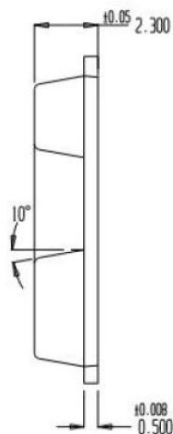


Diode Recovery Test Circuit & Waveforms



Technical drawing of a square plate with a central hole. The drawing includes the following dimensions and features:

- Overall width: 9.900 ± 0.05
- Overall height: 11.700 ± 0.10
- Inner width: 9.800 ± 0.05
- Inner height: 10.400 ± 0.05
- Top flange width: 0.700 ± 0.10
- Top flange height: 0.600 ± 0.05
- Bottom flange width: 0.750×2
- Bottom flange height: 0.600 ± 0.10
- Central hole diameter: $\varnothing 3.00 \pm 0.03$
- Central hole position: Aa
- Distance from center to side hole center: 0.630 ± 0.05
- Side hole diameter: $\varnothing 0.30 \pm 0.05$
- Side hole position: 1
- Distance from center to bottom hole center: 0.700×6
- Bottom hole diameter: $\varnothing 0.10 \pm 0.025$
- Bottom hole position: (0.35)



Revision History:

Revision	Date	Major changes
1.0	2025/7/18	Release of Preliminary version.
2.0	2025/11/6	Update Qg Qgs Qgd and g _{FS} .
3.0	2026/04/01	Update Ciss Coss and Crss.