

TM25G04GD

N+P-Channel Enhancement Mode Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

General Features

N Channel

$V_{DS} = 40V$ $I_D = 25A$

$R_{DS(ON)} = 17m\Omega$ (typ.) @ $V_{GS} = 10V$

P Channel

$V_{DS} = -40V$ $I_D = -23A$

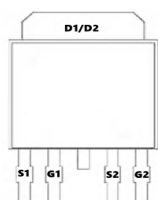
$R_{DS(ON)} = 35m\Omega$ (typ.) @ $V_{GS} = -10V$

100% UIS Tested

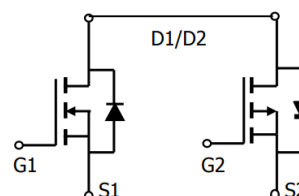
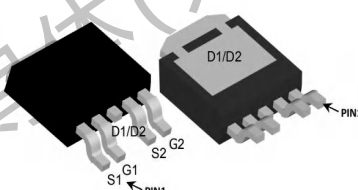
100% R_g Tested



GD:TO-252-4L



Marking: 25G04 OR 4012



Absolute Maximum Ratings ($T_c = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D @ T_a = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	25	-23	A
$I_D @ T_a = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	19.2	-13.2	A
I_{DM}	Pulsed Drain Current	80	-70	A
EAS	Single Pulse Avalanche Energy	25	25	mJ
$P_D @ T_c = 25^\circ C$	Total Power Dissipation	32.9	32.9	W
I_{AS}	Avalanche Current, Single pulse	10	-9	A
T_{STG}	Storage Temperature Range	-55 to 175	-55 to 175	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 175	-55 to 175	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	---	60	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	3.8	$^\circ C/W$

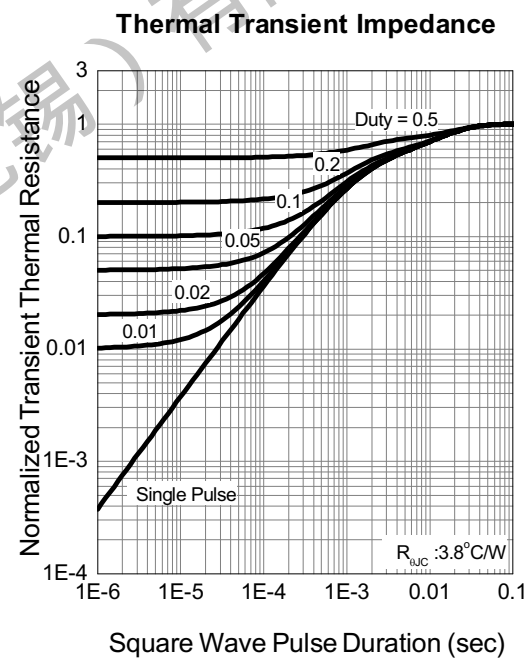
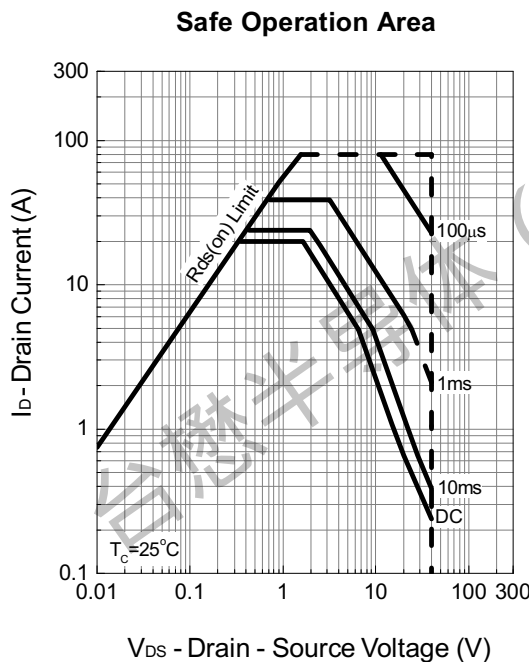
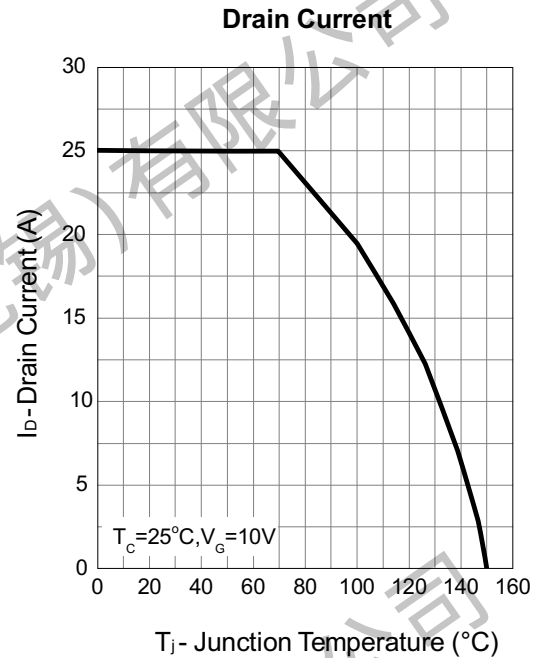
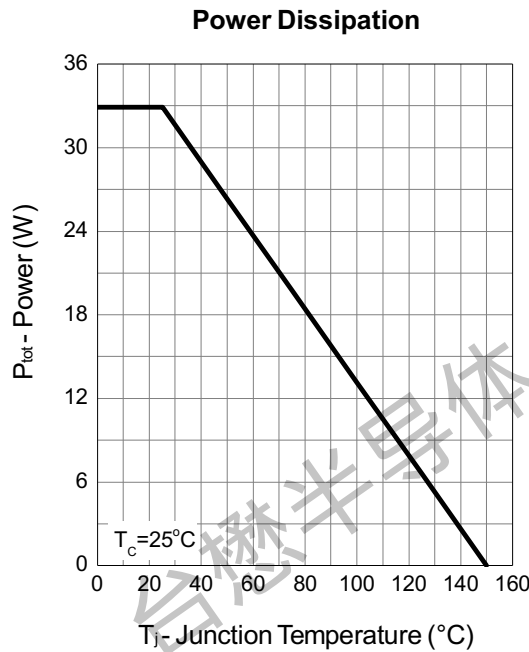
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N+P-Channel Enhancement Mode Mosfet

N Channel Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	N Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1.2	1.6	2.0	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^d	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =10A	-	17	24	mΩ
		V _{GS} =4.5V, I _{DS} =5A	-	25	37	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.75	1.1	V
t _{rr}	Reverse Recovery Time	I _{DS} =10A, dI _{SD} /dt=100A/μs	-	13	-	ns
Q _{rr}	Reverse Recovery Charge		-	8.7	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	2.5	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, Frequency=1.0MHz	-	815	-	pF
C _{oss}	Output Capacitance		-	95	-	
C _{rss}	Reverse Transfer Capacitance		-	60	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =20V, R _L =20Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	7.8	-	ns
t _r	Turn-on Rise Time		-	6.9	-	
t _{d(OFF)}	Turn-off Delay Time		-	22.4	-	
t _f	Turn-off Fall Time		-	4.8	-	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _{DS} =10A	-	15.7	22	nC
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =4.5V, I _{DS} =10A	-	7.5	10.5	
Q _{gth}	Threshold Gate Charge		-	1.85	-	
Q _{gs}	Gate-Source Charge		-	3.24	-	
Q _{gd}	Gate-Drain Charge		-	2.75	-	

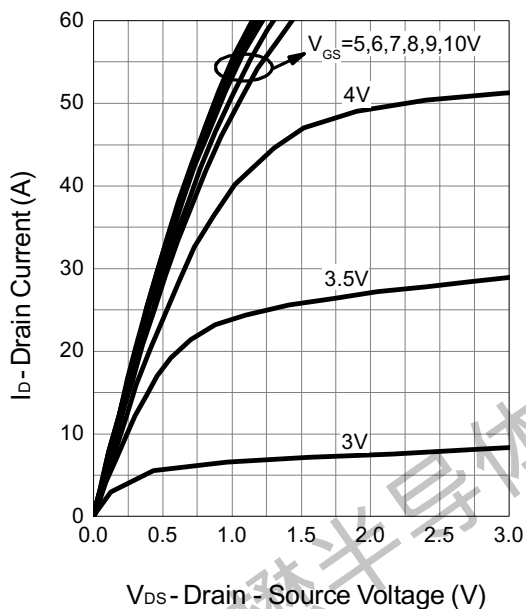
N Channel Typical Operating Characteristics



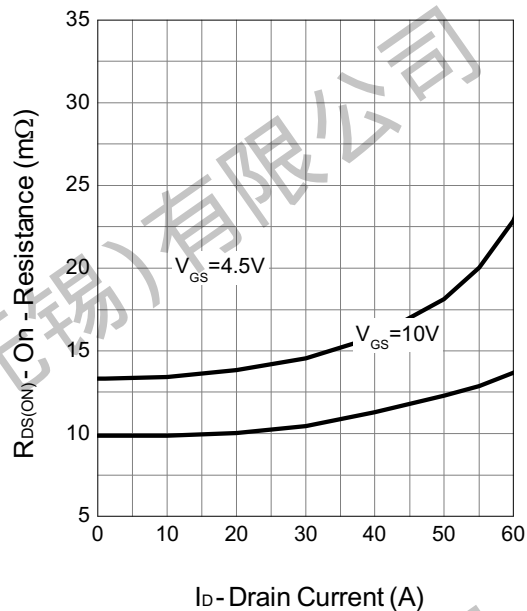
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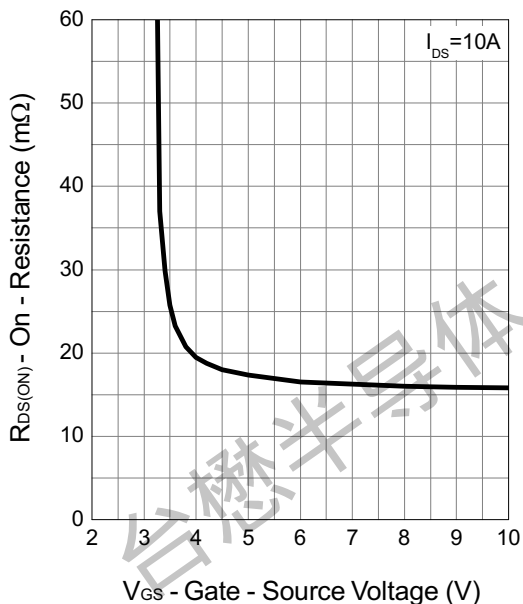
Output Characteristics



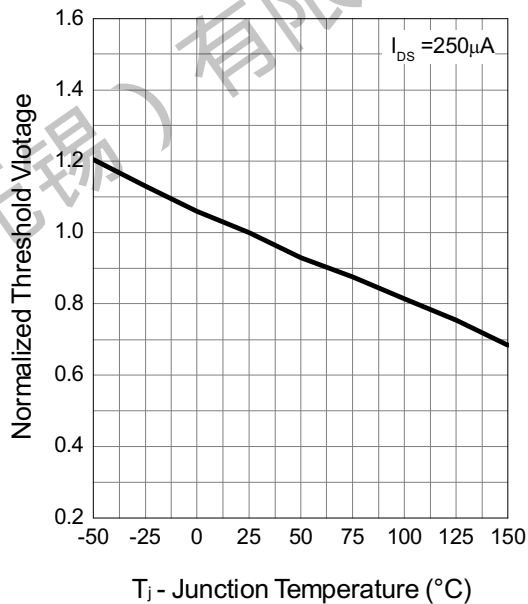
Drain-Source On Resistance



Gate-Source On Resistance



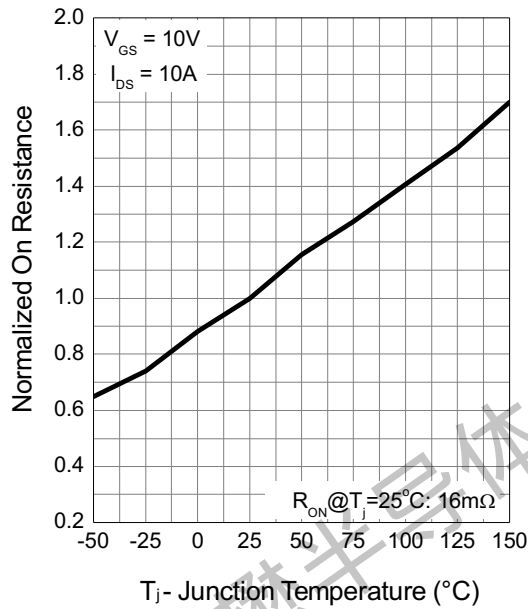
Gate Threshold Voltage



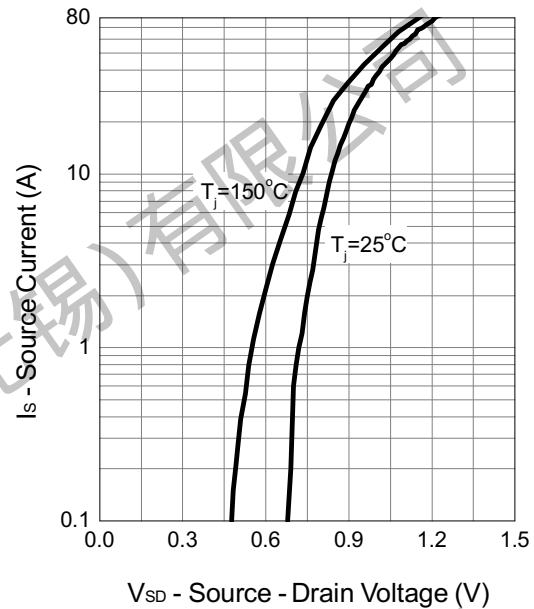
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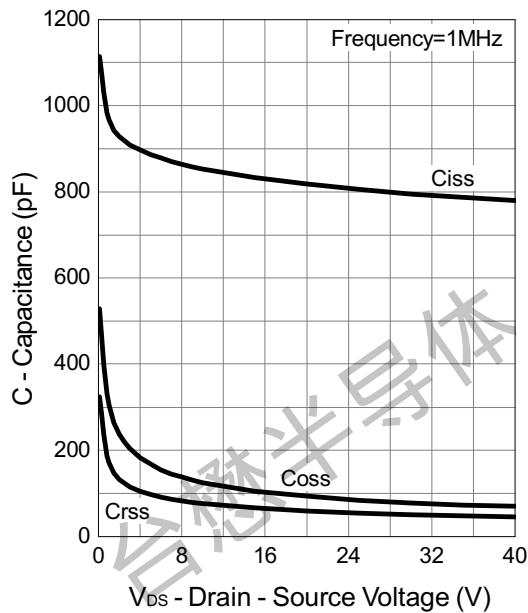
Drain-Source On Resistance



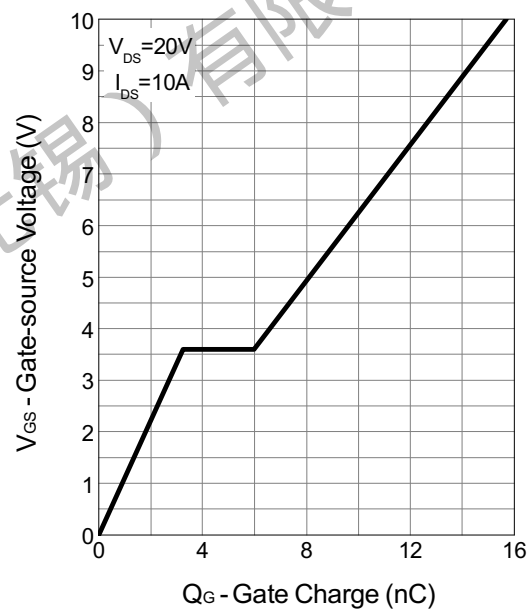
Source-Drain Diode Forward



Capacitance



Gate Charge



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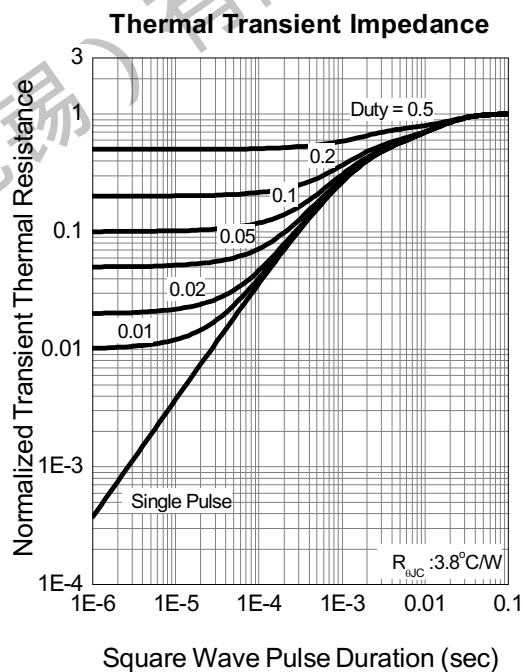
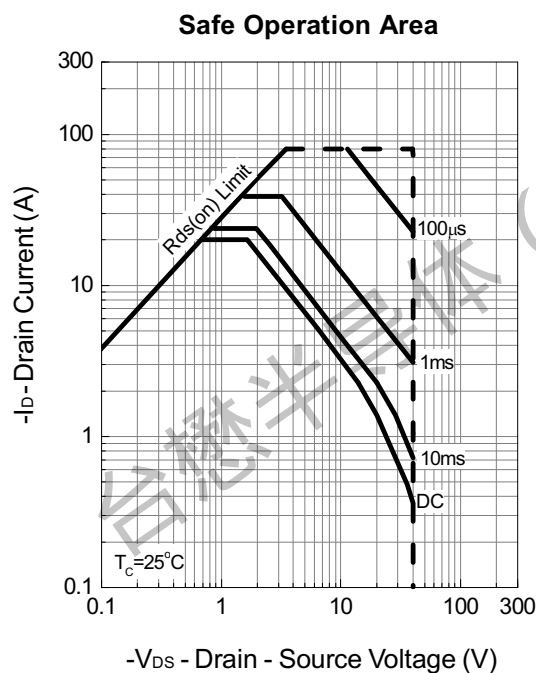
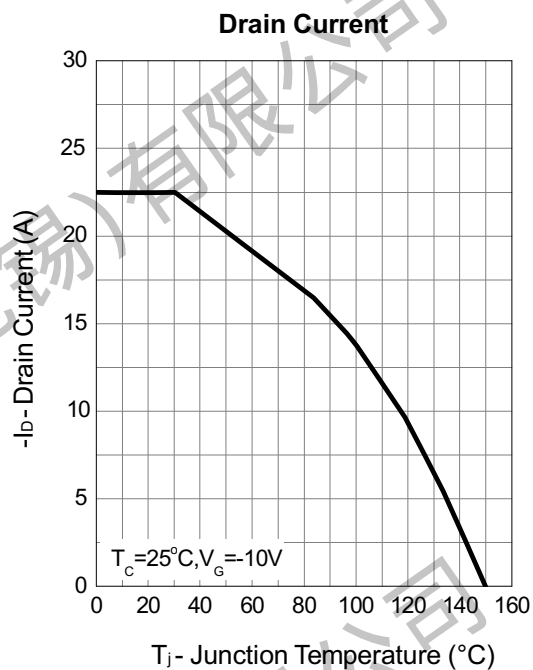
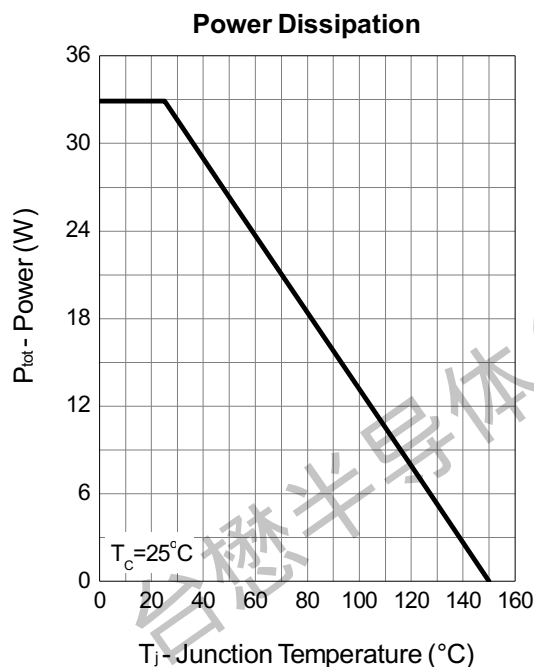
P Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	P Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-32V, V _{GS} =0V	-	-	-1	μA
		T _J =85°C	-	-	-30	mA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-1.0	-1.75	-2.5	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^d	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-10A	-	35	46	mΩ
		V _{GS} =-4.5V, I _{DS} =-5A	-	47	57	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V	-	-0.75	-1	V
t _{rr}	Reverse Recovery Time	I _{DS} =-10A, dI _{SD} /dt=100A/μs	-	15	-	ns
Q _{rr}	Reverse Recovery Charge		-	8	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	8	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-20V, Frequency=1.0MHz	-	668	-	pF
C _{oss}	Output Capacitance		-	98	-	
C _{rss}	Reverse Transfer Capacitance		-	72	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-20V, R _L =20Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	8.7	-	ns
t _r	Turn-on Rise Time		-	7	-	
t _{d(OFF)}	Turn-off Delay Time		-	31	-	
t _f	Turn-off Fall Time		-	17	-	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =-20V, V _{GS} =-10V, I _{DS} =-10A	-	15	-	nC
Q _g	Total Gate Charge	V _{DS} =-20V, V _{GS} =-4.5V, I _{DS} =-10A	-	7.5	-	
Q _{gth}	Threshold Gate Charge		-	1.4	-	
Q _{gs}	Gate-Source Charge		-	2.4	-	
Q _{gd}	Gate-Drain Charge		-	3.5	-	

Note d : Pulse test; pulse width≤300μs, duty cycle≤2%.

Note e : Guaranteed by design, not subject to production testing.

P Channel Typical Operating Characteristics

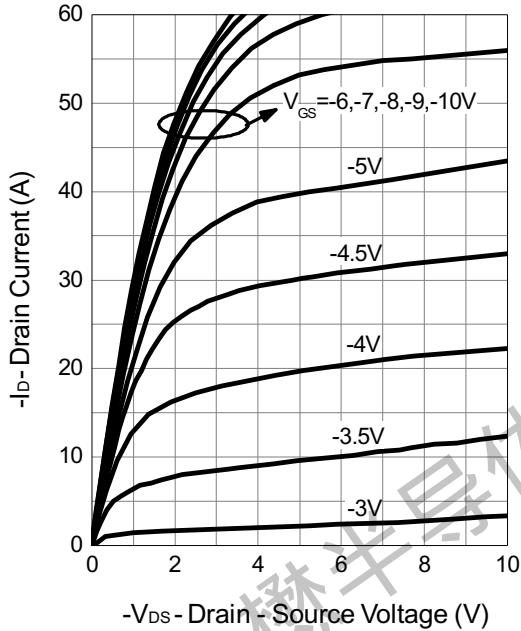




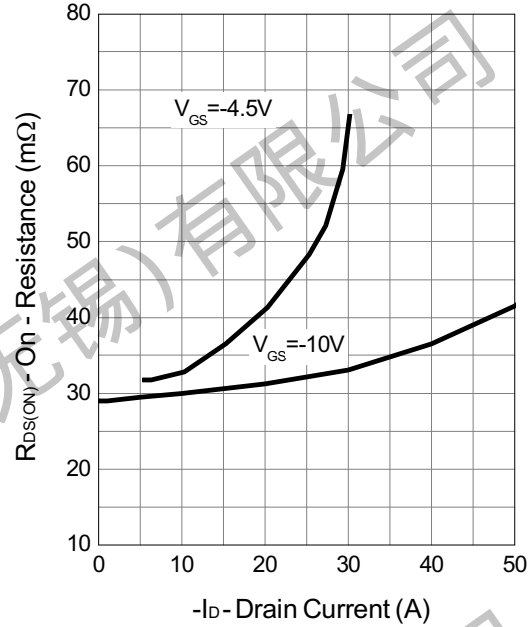
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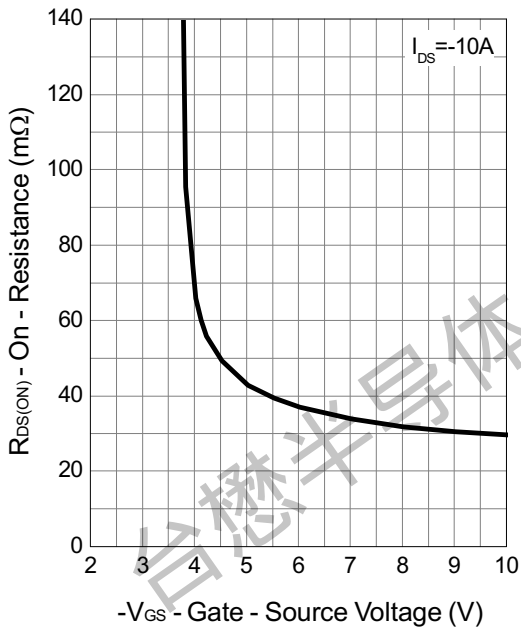
Output Characteristics



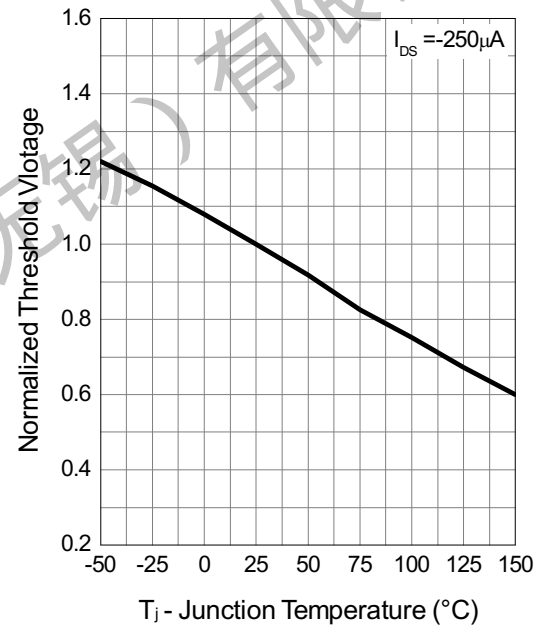
Drain-Source On Resistance



Gate-Source On Resistance



Gate Threshold Voltage

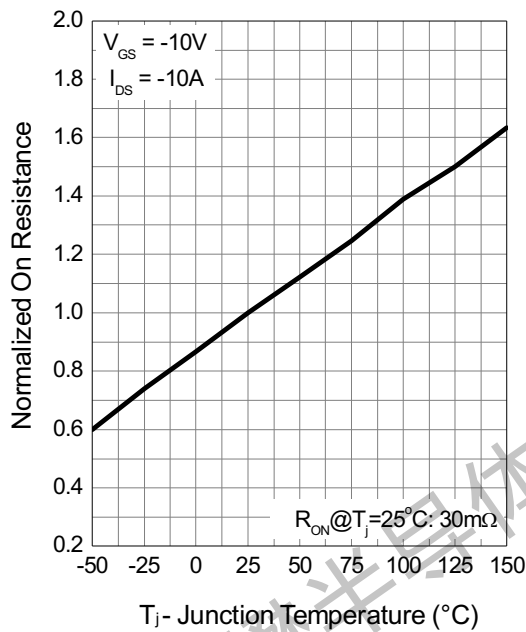




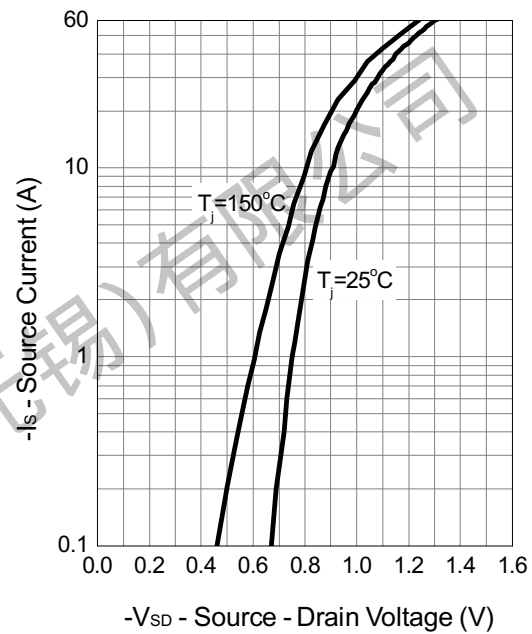
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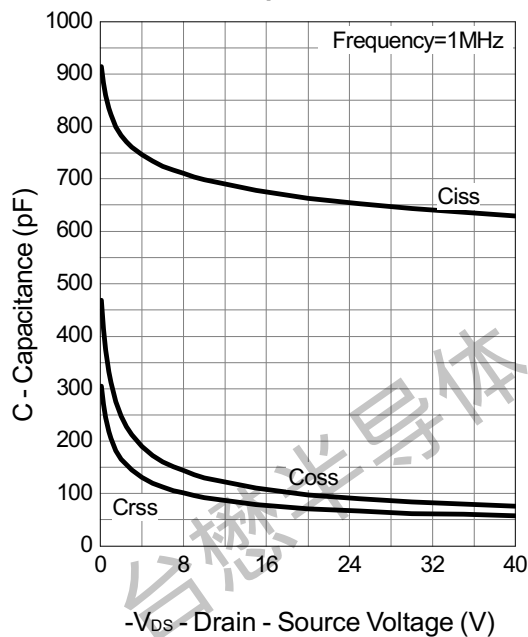
Drain-Source On Resistance



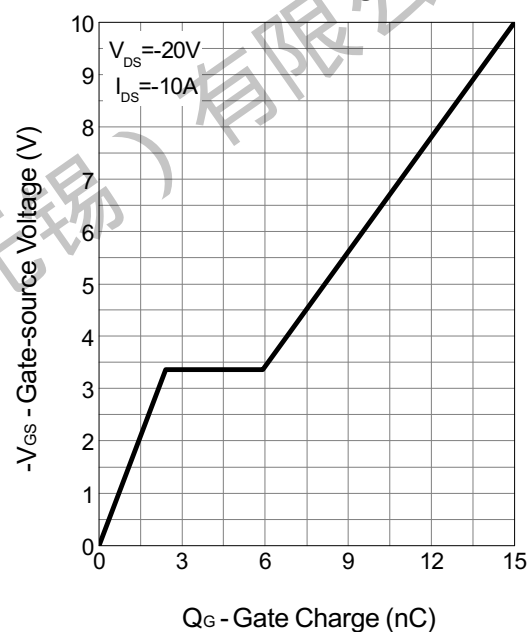
Source-Drain Diode Forward



Capacitance



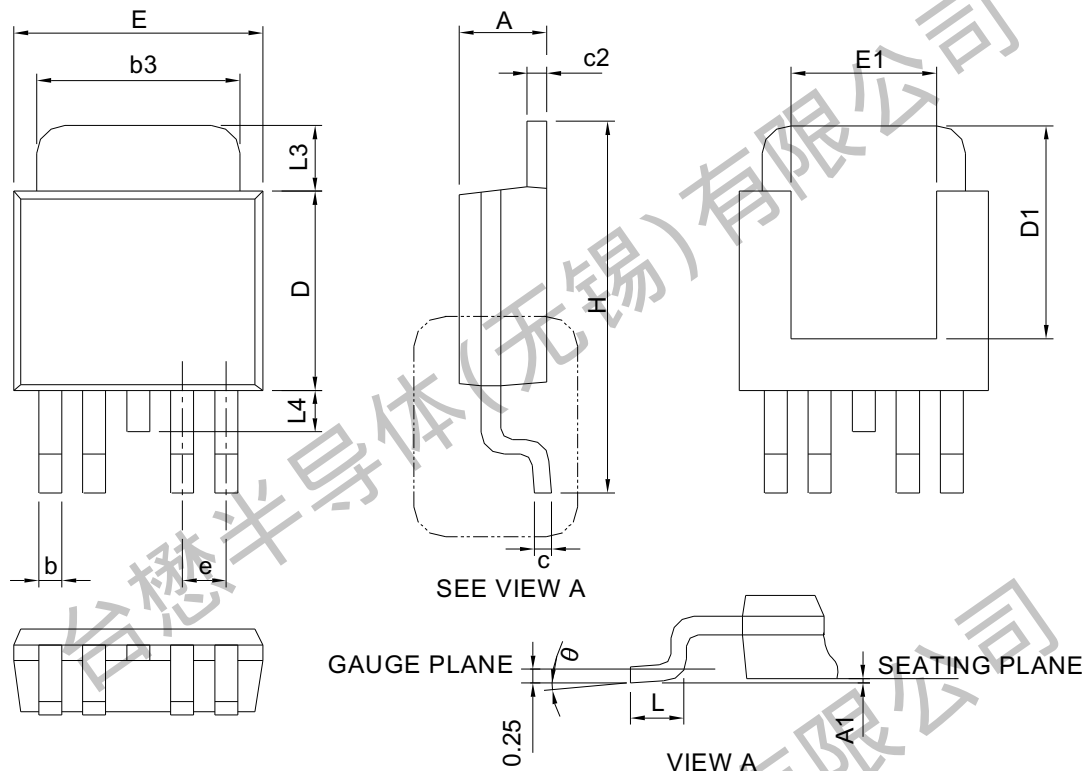
Gate Charge



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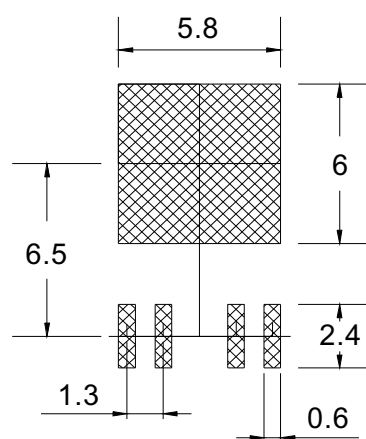
N+P-Channel Enhancement Mode Mosfet

Package Mechanical Data:TO-252-4L



SYMBOL	TO-252-4			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1	-	0.2	-	0.008
b	0.50	0.71	0.020	0.028
b3	4.32	5.46	0.170	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	1.30 BSC		0.051 BSC	
H	9.40	10.41	0.370	0.410
L	1.40	1.78	0.055	0.070
L3	0.89	2.03	0.035	0.080
L4	-	1.02	-	0.040
θ	0°	8°	0°	8°

RECOMMENDED LAND PATTERN

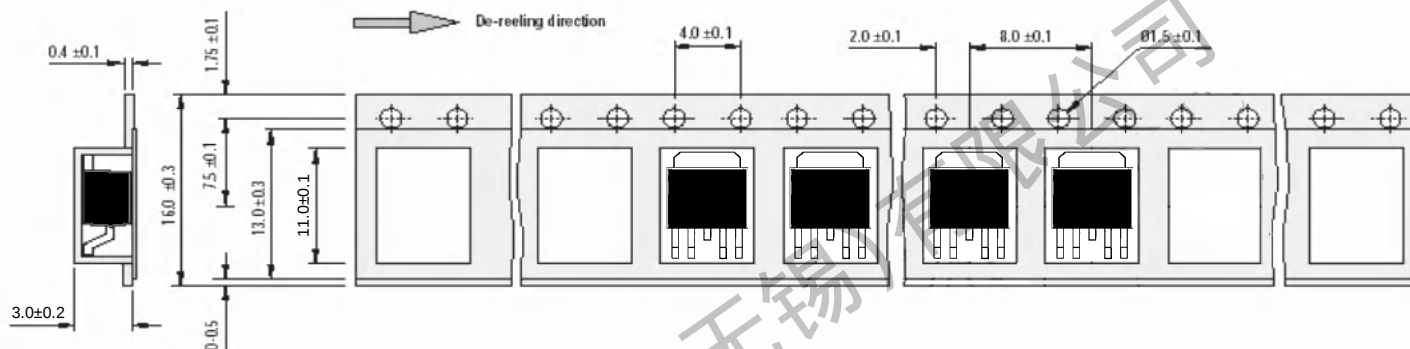


UNIT: mm

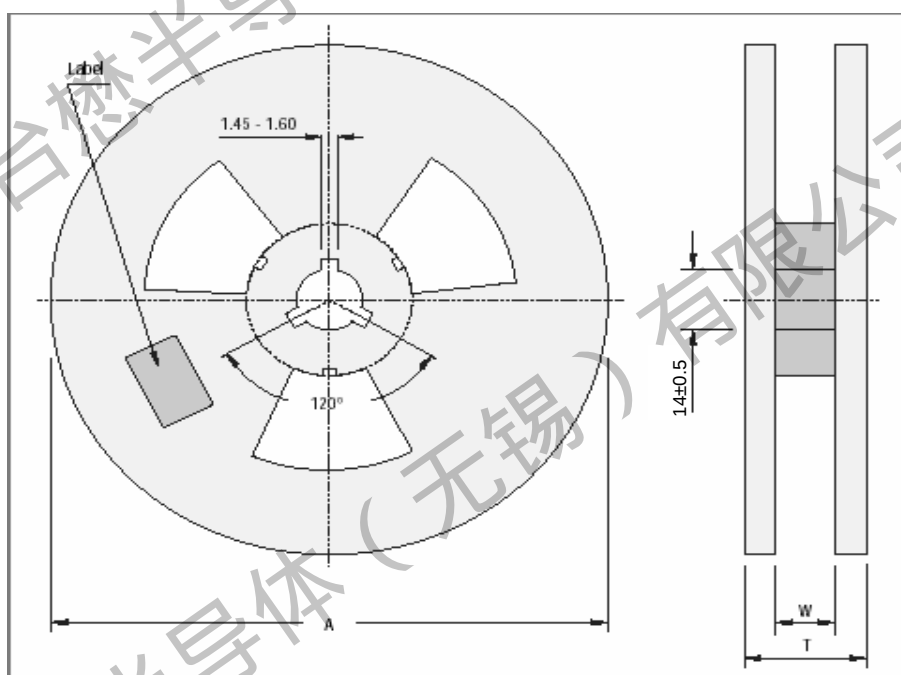
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TO-252-4L Embossed Carrier Tape



TO-252-4L Reel



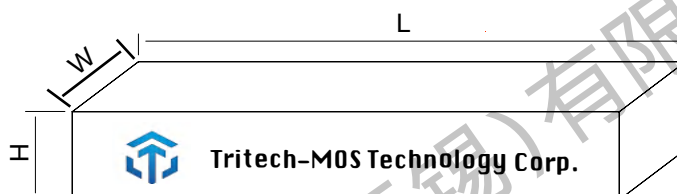
1.TO-252-4L Packaging

Package	Packing Form	Quantity		
		Reel	Inner Box	Outbox
TO-252-4L	Reel	2500	5	1

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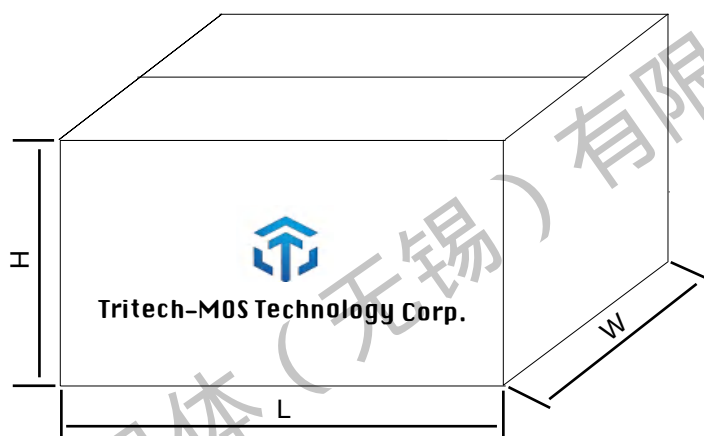
Inner Box



Dimension : 370 (L)×355(W) ×50(H) mm

Quantity : 2500 × 2Ea = 5000pcs

Outer Box



Dimension : 380(L)×380(W) ×275(H) mm

Quantity : 5000 × 5Ea = 25000pcs

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Revision history:

Date	Rev	Description	Page
2023.06.11	23.06	Original	