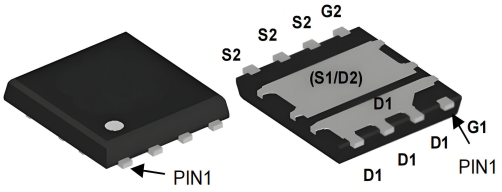
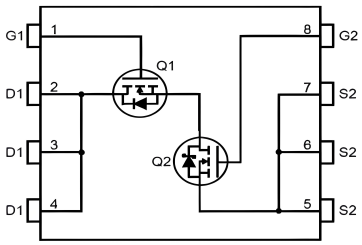
Description：

This N+N Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.





Features：

N-Channel:V_{DS}=40V,I_D=45A,$R_{DS(ON)}$<7.5mΩ @V_{GS}=10V（Typ：6mΩ）

N-Channel: V_{DS}=40V,I_D=60A,$R_{DS(ON)}$<5.5mΩ @V_{GS}=10V（Typ：4.5mΩ）

1) Low gate charge.
2) Green device available.
3) Advanced high cell denity trench technology for ultra low $R_{DS(ON)}$.
4) Excellent package for good heat dissipation.
5) MSL3

Package Marking and Ordering Information：

Part NO.	Marking	Package	Packing
TMD0705DTG	D0705DT	TDFN5*6 Asym	5000 pcs/Reel

Absolute Maximum Ratings：(T_C=25℃ unless otherwise noted)

Symbol	Parameter	N-Channel	N-Channel	Units
V_{DS}	Drain-Source Voltage	40	40	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D	Continuous Drain Current- T_C=25℃[1]	45	60	A
	Continuous Drain Current-T_C=100℃[1]	31.5	42	
I_{DM}	Pulsed Drain Current [2]	180	240	A
E_{AS}	Single pulse avalanche energy[3]	36	85	mJ
P_D	Power Dissipation - T_C=25℃	40	50	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		℃

Thermal Characteristics：

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JC}$	Thermal Resistance,Junction to Cast	3.1	2.5	℃/W

N-Channel Electrical Characteristics: (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=250μA	40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS}=0V, V_{DS}=40V	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V, V_{DS}=0A	---	---	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	1	1.5	2	V
$R_{DS(ON)}$	Drain-Source On Resistance[4]	V_{GS}=10V,I_D=20A	---	6	7.5	mΩ
		V_{GS}=4.5V,I_D=10A	---	9	11	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=20V, V_{GS}=0V, f=1MHz	---	660	---	pF
C_{oss}	Output Capacitance		---	357	--	
C_{rss}	Reverse Transfer Capacitance		---	26	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=20V, I_D=50A, R_{ENG}=3Ω ,V_{GS}=10V	---	5	---	ns
t_r	Rise Time		---	3	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	21	---	ns
t_f	Fall Time		---	2.3	---	ns
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=20V, I_D=50A	---	12	---	nC
Q_{gs}	Gate-Source Charge		---	1.8	---	nC
Q_{gd}	Gate-Drain “Miller” Charge		---	2.3	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS}=0V, I_{SD}=1A	---	---	1.2	V
I_S	Continuous Drain Curren	V_D=V_G=0V	---	---	45	A
I_{SM}	Pulsed Drain Current		---	---	180	A

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : TJ=25℃,VDD=20V,V_G=10V,L=0.5mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

N-Typical Characteristics: (T_C=25℃ unless otherwise noted)

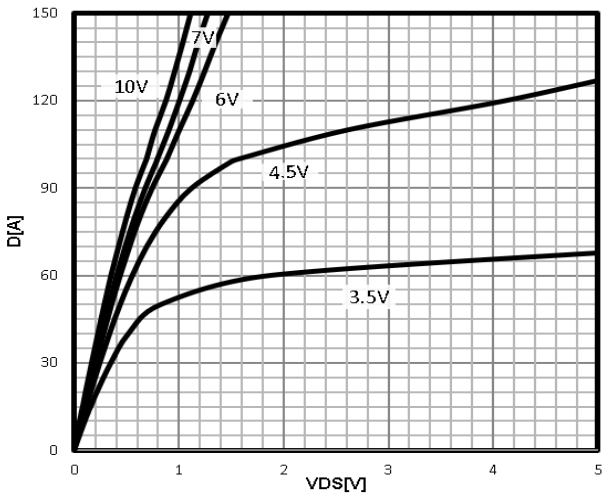


Figure1: Typ. output characteristics
I_D=f(V_{DS})

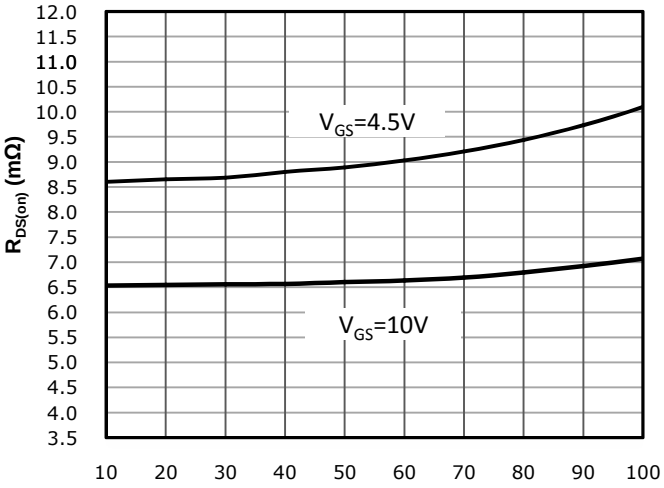


Figure 2: Rds(on) vs Drain Current and Gate Voltage

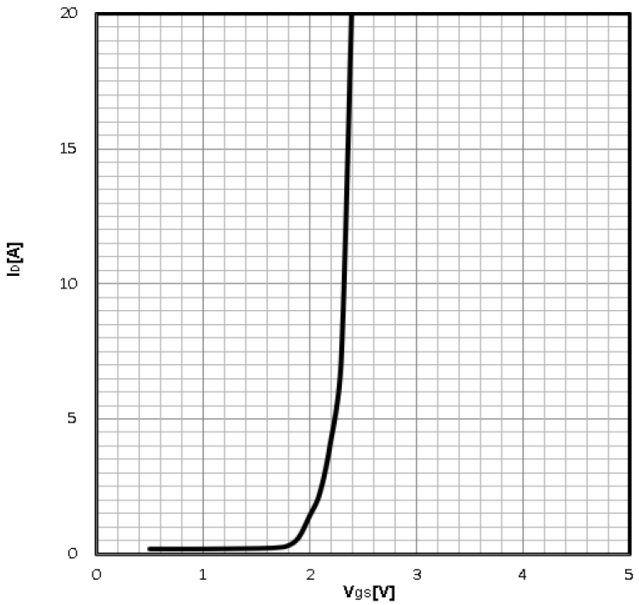


Figure 3: Typ. transfer characteristics
I_D=f(V_{GS})

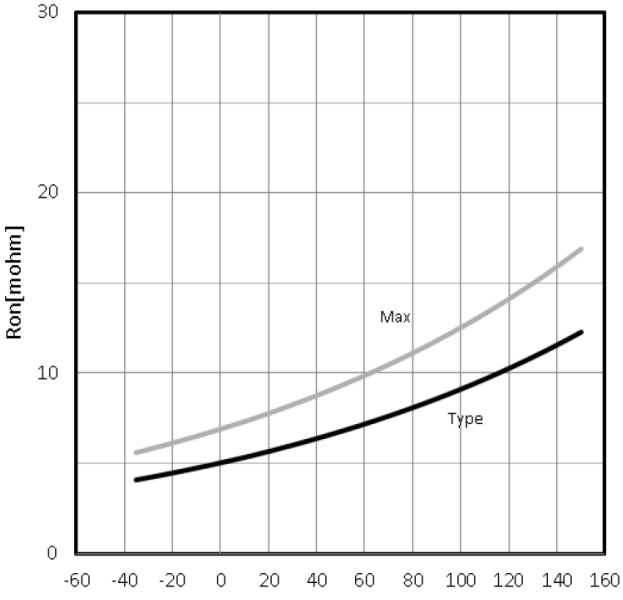


Figure 4: Drain-source on-state resistance
$R_{DS(on)}$=f(T_j);I_D=12A;

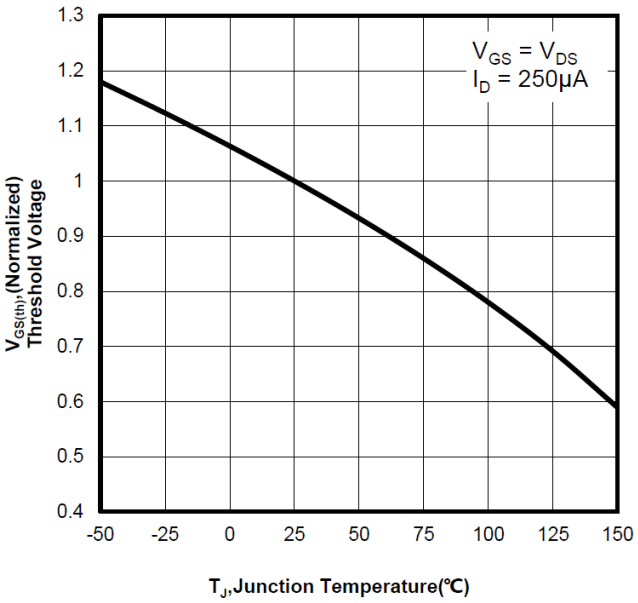


Figure 5 Gate Threshold Voltage
V_{TH}=f(T_j); I_D=250uA

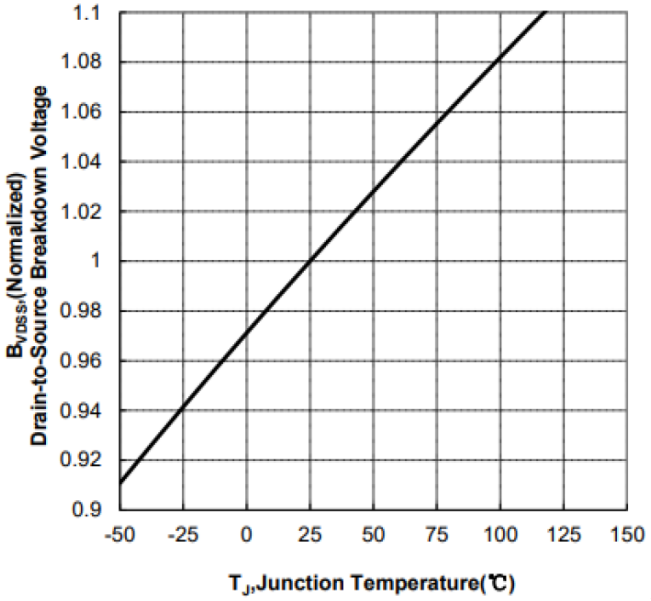


Figure 6: Drain-source breakdown voltage
$V_{BR(DSS)}$=f(T_j); I_D=250uA

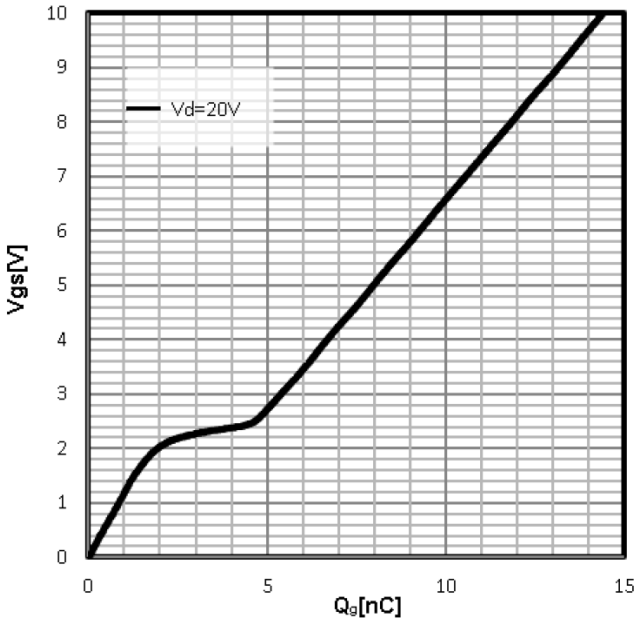


Figure 7: Typ. gate charge
V_{GS}=f(Q_g) ; I_D=5A

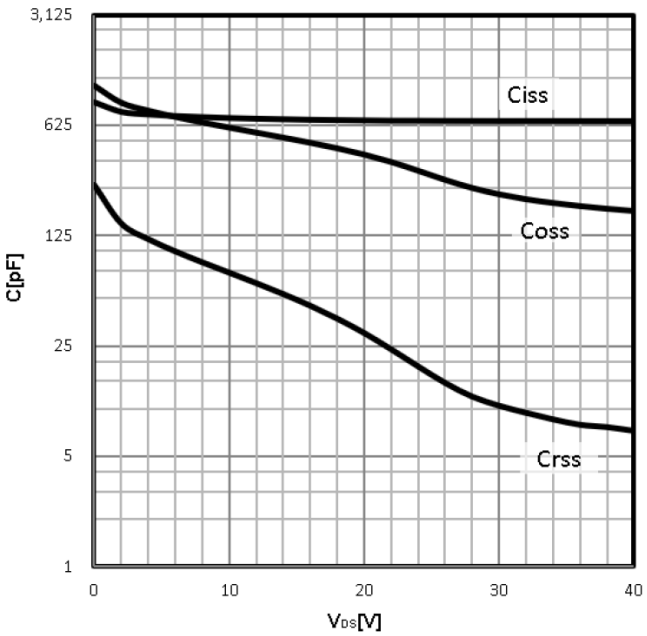


Figure 8: Typ. capacitances
C =f(V_{DS}); V_{GS}=0V; f =1MHz

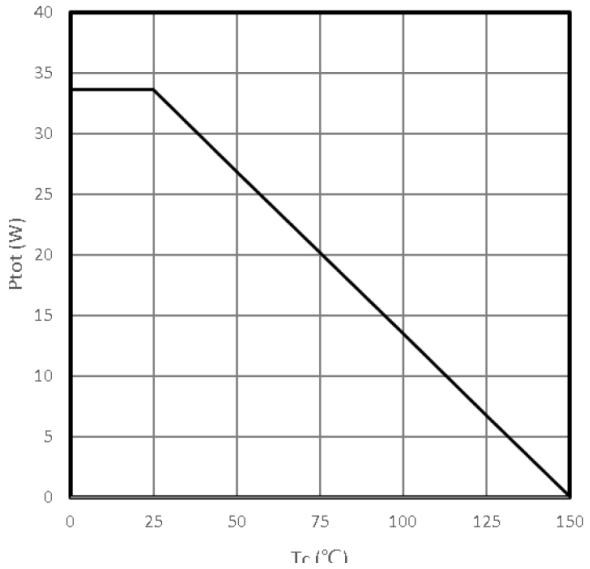


Figure 9: Power Dissipation
$P_{tot}=f(T_C)$

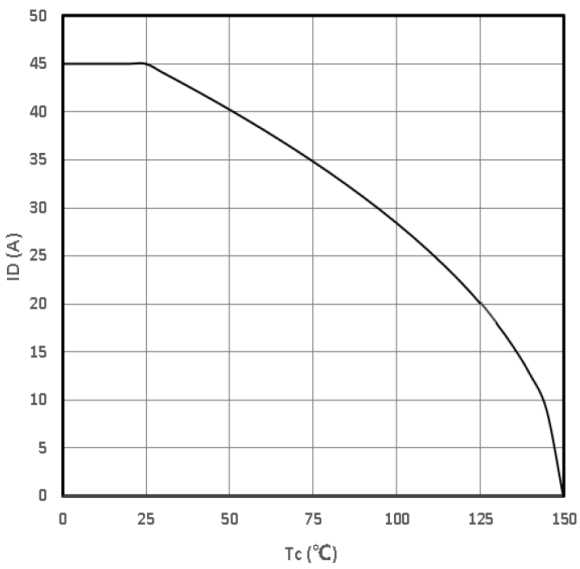


Figure 10: Maximum Drain Current
$I_D=f(T_C)$

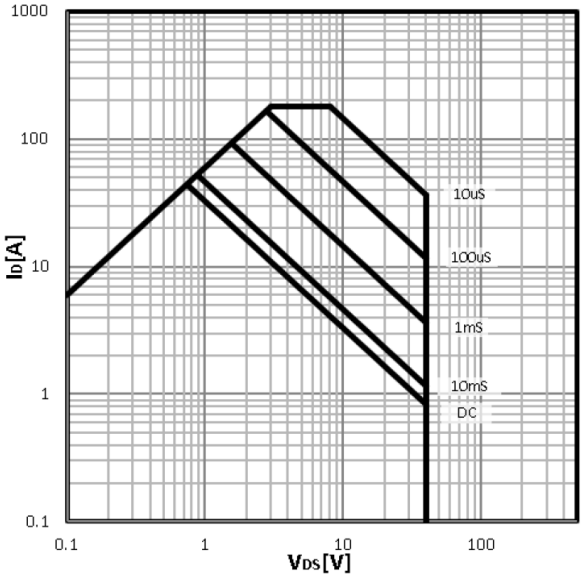


Figure.11: Safe operating area
$I_D=f(V_{DS})$

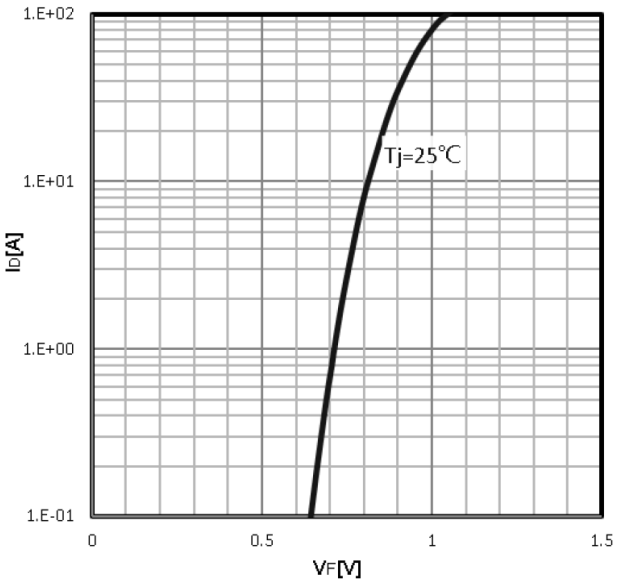
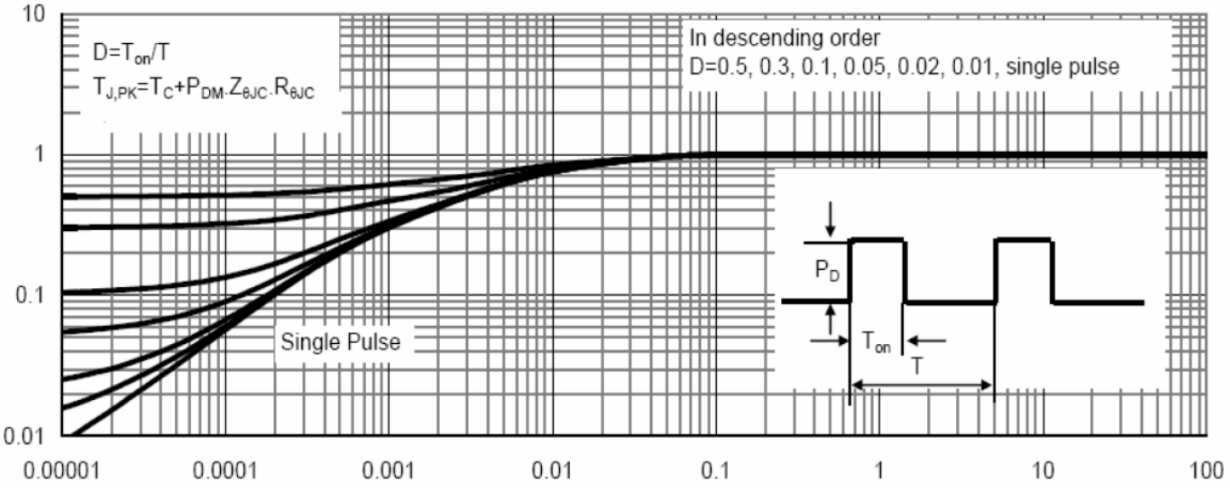


Figure 12 Body Diode Forward Voltage Variation
$I_F=f(V_{GS})$



Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

N-Channel Electrical Characteristics: (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=250μA	40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS}=0V, V_{DS}=40V	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V, V_{DS}=0A	---	---	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	1	1.5	2	V
$R_{DS(ON)}$	Drain-Source On Resistance[4]	V_{GS}=10V,I_D=20A	---	4.5	5.5	mΩ
		V_{GS}=4.5V,I_D=10A	---	6.8	8	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=20V, V_{GS}=0V, f=1MHz	---	997.5	---	pF
C_{oss}	Output Capacitance		---	580	---	
C_{rss}	Reverse Transfer Capacitance		---	32	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}= 20V,I_D=-50A V_{GS}= 10V, R_{GEN}=3Ω	---	6.5	---	ns
t_r	Rise Time		---	2.7	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	27	---	ns
t_f	Fall Time		---	3.6	---	ns
Q_g	Total Gate Charge	V_{GS}=10V,V_{DS}=20V, I_D=50A	---	17	---	nC
Q_{gs}	Gate-Source Charge		---	4.5	---	nC
Q_{gd}	Gate-Drain “Miller” Charge		---	2	---	nC
Drain-Source Diode Characteristics						
I_S	Continuous Drain to Source Diode	V_D=V_G=0V	---	---	60	A
I_{SM}	Pulsed Drain to Source Diode		---	---	240	---
V_{SD}	Source-Drain Diode Forward Voltage	V_{GS}=0V,I_S=1A	---	---	1.2	V

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : TJ=25℃,VDD=20V,V_G=10V,L=0.5mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

N-Typical Characteristics: (T_C=25℃ unless otherwise noted)

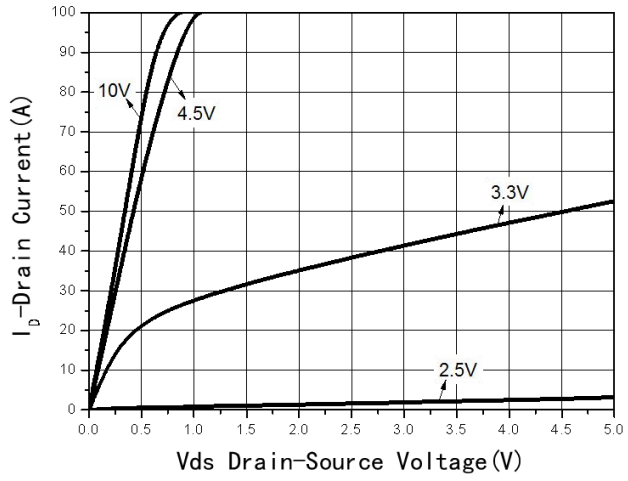


Fig1 Output Characteristics

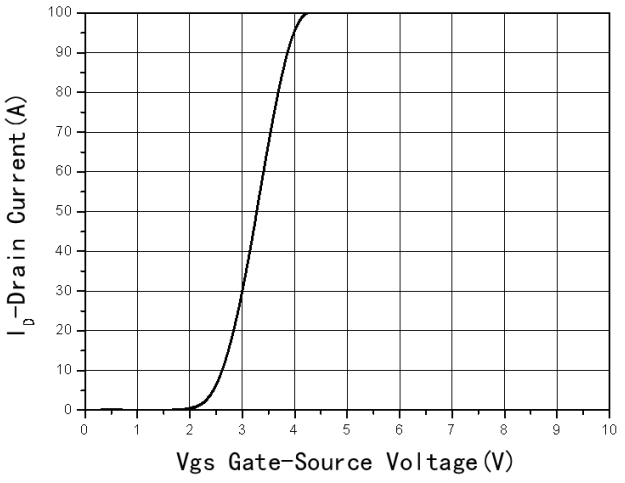


Fig2 Transfer Characteristics

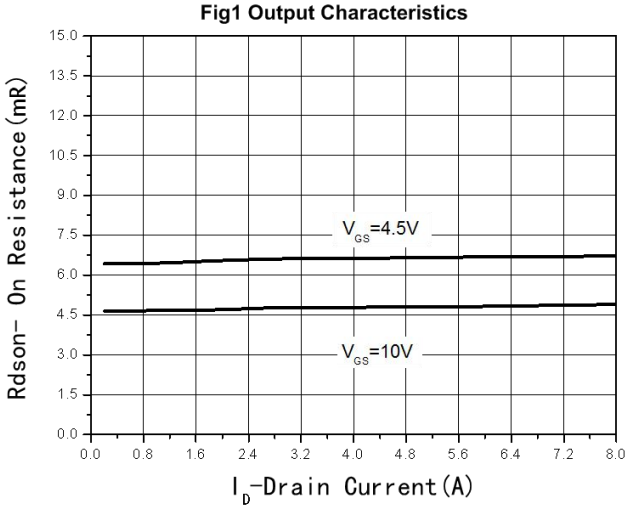


Fig3 Rdson-Drain current

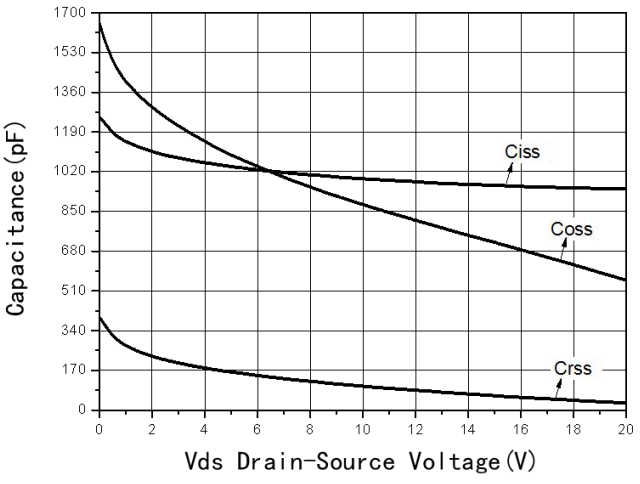


Fig4 Capacitance vs Vds

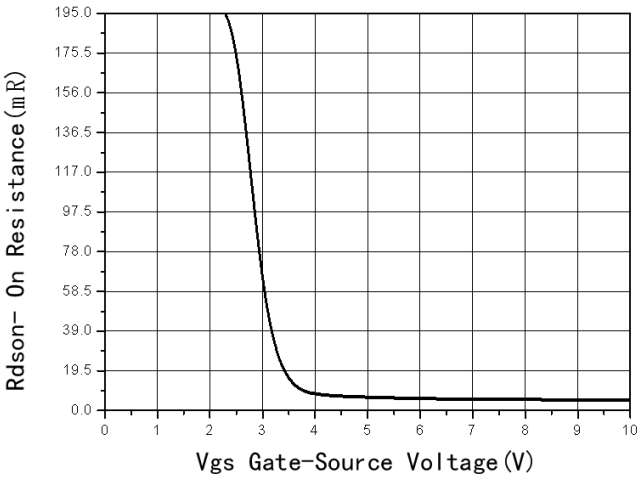


Fig5 Rdson-Gate Drain voltage

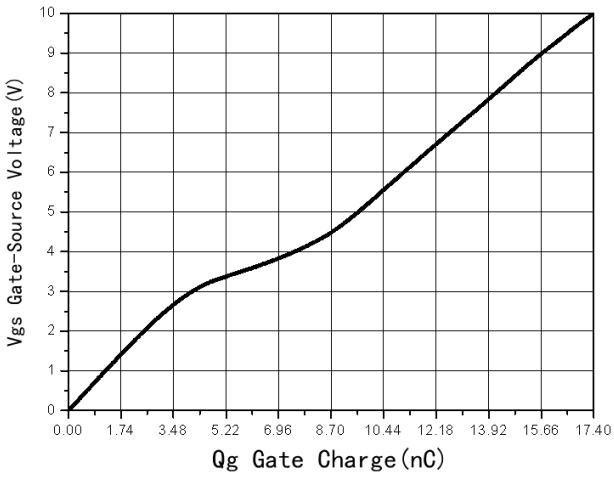


Fig6 Gate Charge

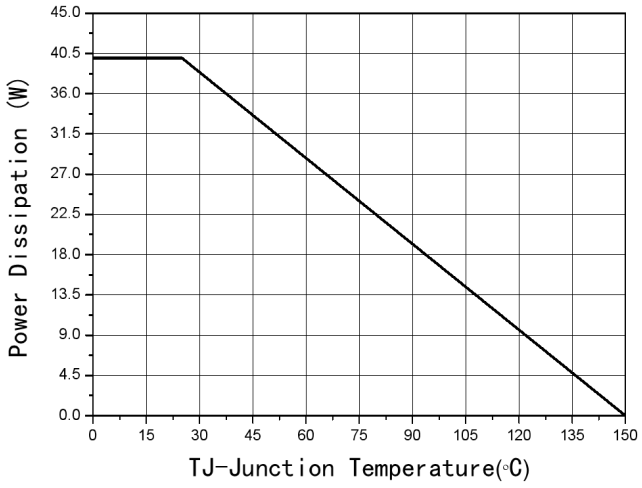


Fig7 Power De-rating

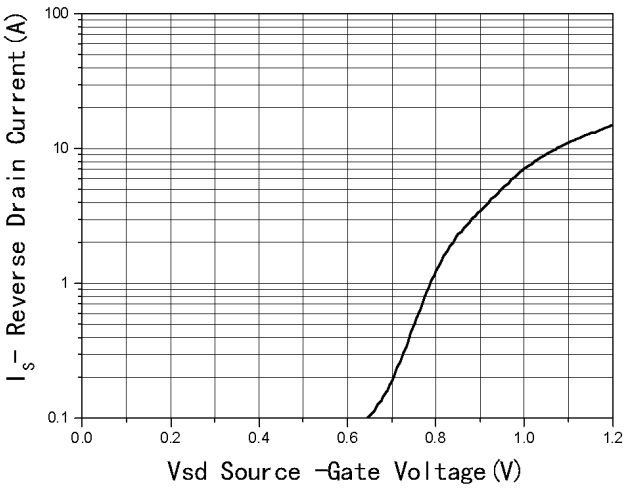
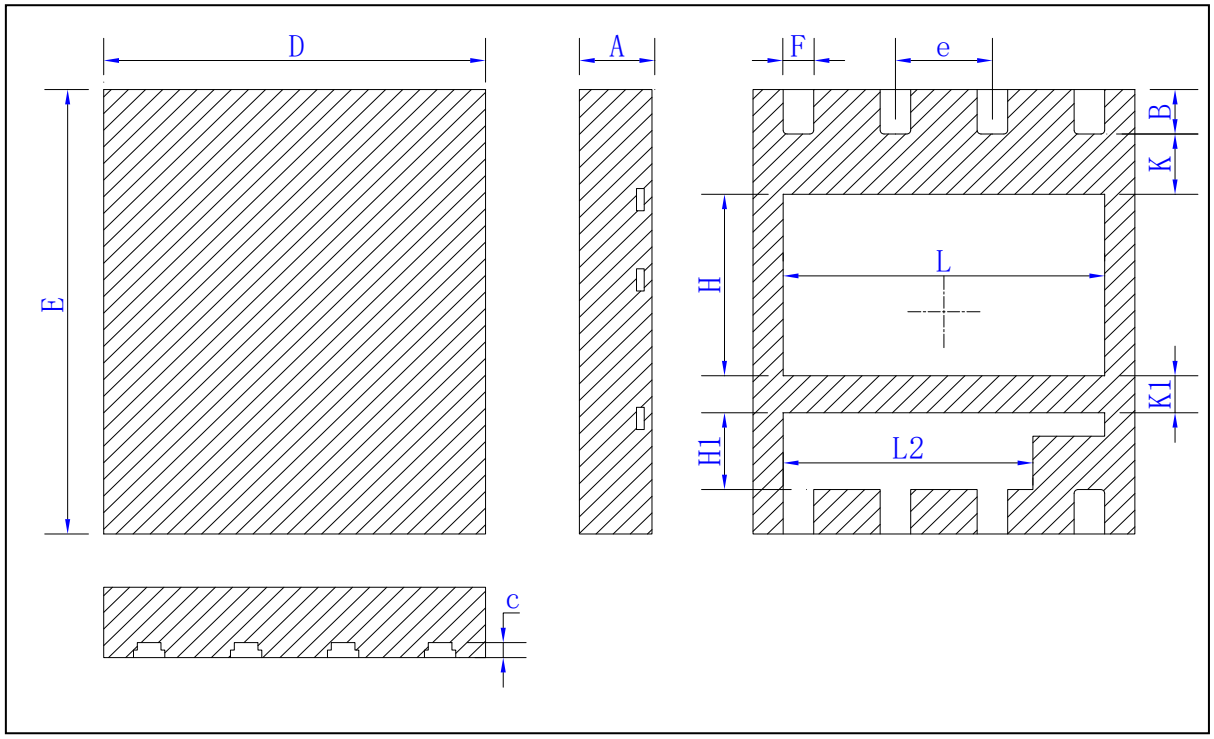


Fig8 Source-Drain Diode Forward

TDFN5×6 Asym Package Information：



UNIT：mm

Symbol	Min	Typ	Max
A	0.90	0.95	1.00
B	0.50	0.60	0.70
C	0.153	0.203	0.253
D	4.90	5.00	5.10
E	5.90	6.00	6.10
e	1.22	1.27	1.32
F	0.35	0.40	0.45
H	2.35	2.45	2.55
H1	0.93	1.03	1.13
L	4.06	4.21	4.36
L2	3.07	3.22	3.37
K	7	0.80	0.90
K1	0.40	0.50	0.60

Marking Information：

①. Doingter LOGO

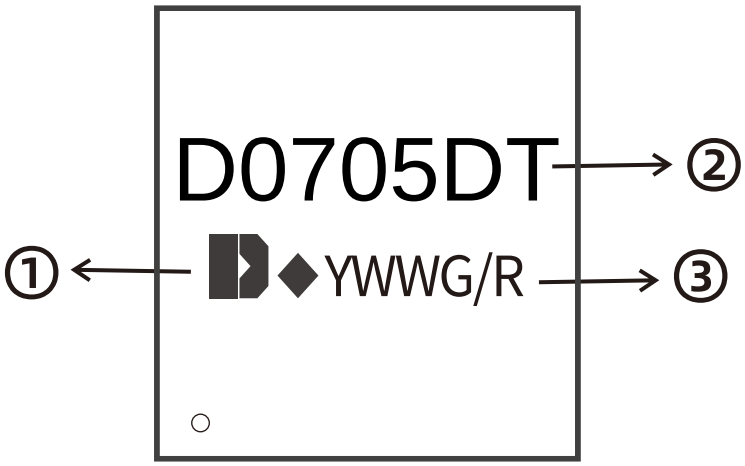
②. Part NO.

③. Date Code(YWWG / R)

Y：Year Code，last digit of the year

WW：Week Code(01-53)

G/R：G(Green) /R(Lead Free)



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-04-13	Release of final version

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