●General Description

It combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

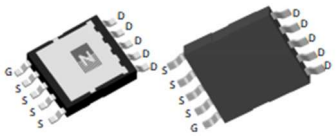
●Features

■Low $R_{DS(ON)}$ to minimize conductive loss
■Low Gate Charge for fast switching
■Low thermal resistance

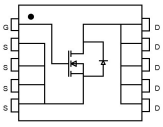
●Application

■BLDC motor driver
■DC-DC
■Load switch

●Product Summary



TCPAK5x7



V_{DS}=60V
$R_{DS(ON)}$ =1.3mR
I_D=296A

●Ordering Information

Part NO.	ZMS012N06HTNC
Marking	12N06H
Packing information	REEL TAPE
Basic ordering unit (pcs)	2500

●Absolute Maximum Ratings（T_A=25℃,unless otherwise specified）

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}		-	60	V
Gate-source voltage	V_{GS}		-20	20	V
Continuous drain current	I_D	V_{GS}=10V, T_C=25℃	-	296	A
	I_D	V_{GS}=10V, T_C=75℃	-	242	A
	I_D	V_{GS}=10V, T_C=100℃	-	209	A
Pulsed drain current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_C = 25 °C	-	1184	A
Diode continuous current	I_S	V_{GS}=0V, T_C=25℃	-	192	A
Diode pulse current	$I_{S,pulse}$	V_{GS}=0V, Pulsed, t_p ≤ 10 μs, T_C = 25 °C	-	768	A
Total power dissipation	P_D	T_C=25℃	-	250	W
Total power dissipation	P_D	T_A=25℃	-	5	W
Operating junction temperature	T_J		-55	175	℃
Storage temperature	T_{STG}		-55	175	℃
Single pulse avalanche energy	E_{AS}	L=0.1mH, V_{GS}=10V, R_g=25Ω	-	423	mJ
		L=0.5mH, V_{GS}=10V, R_g=25Ω	-	761	mJ

ESD level (HBM)		CLASS 2

● Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	0.6	°C/W
Thermal resistance, junction - ambient	R_{thJA} ①	-	-	30	°C/W
Soldering temperature	T_{sold}	-	-	260	°C

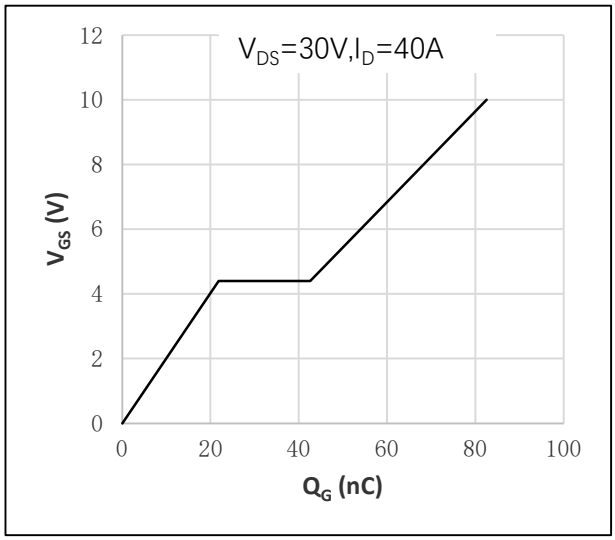
● Electronic Characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250uA	2	2.7	4	V
Drain-source leakage current	I_{DSS}	V_{GS}=0V, V_{DS}=60V	-	-	1	uA
Gate- source leakage current	I_{GSS}	V_{GS}=±20V, V_{DS} =0V	-	-	100	nA
Static drain-source on resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A, T_j=25℃	-	1.3	1.55	mΩ
		V_{GS}=10V, I_D=40A, T_j=175℃	-	2.4	-	mΩ
Forward transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A	-	21	-	S
Diode forward voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 40A	-	0.8	1.3	V

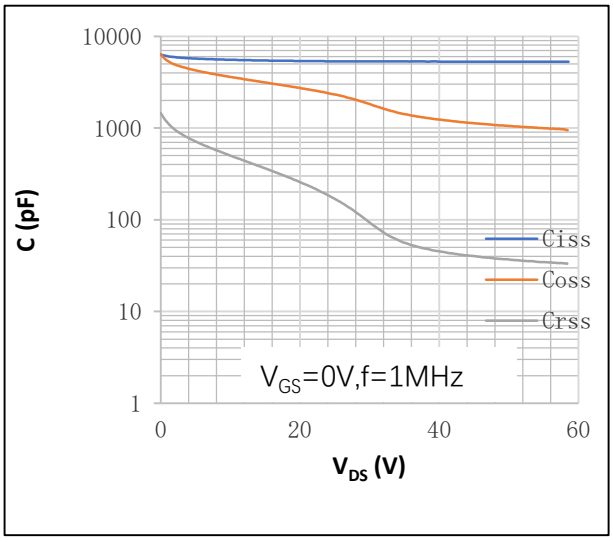
● Dynamic characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	f = 1MHz, V_{DS}=30V, V_{GS}=0V	-	5335	-	pF
Output capacitance	C_{oss}		-	1833	-	pF
Reverse transfer capacitance	C_{rss}		-	94	-	pF
Gate resistance	R_g	f = 1MHz	-	1.3	-	Ω
Total gate charge	Q_g	V_{DD} = 30V, I_D = 40A, V_{GS} = 10V	-	82.5	-	nC
Gate-source charge	Q_{gs}		-	21.9	-	nC
Gate-drain charge	Q_{gd}		-	20.7	-	nC
Turn-on delay time	$t_{D(on)}$	V_{GS}=10V, V_{DS}=30V, R_G =3.3Ω, I_D =40A	-	16	-	ns
Turn-on rise time	t_r		-	24	-	ns
Turn-off delay time	$t_{D(off)}$		-	59	-	ns
Turn-off fall time	t_f		-	11	-	ns
Reverse recovery time	t_{rr}	V_{DD}=30V, dIs/dt = 100A/us, I_S=40A	-	80	-	ns
Reverse recovery charge	Q_{rr}		-	116	-	nC

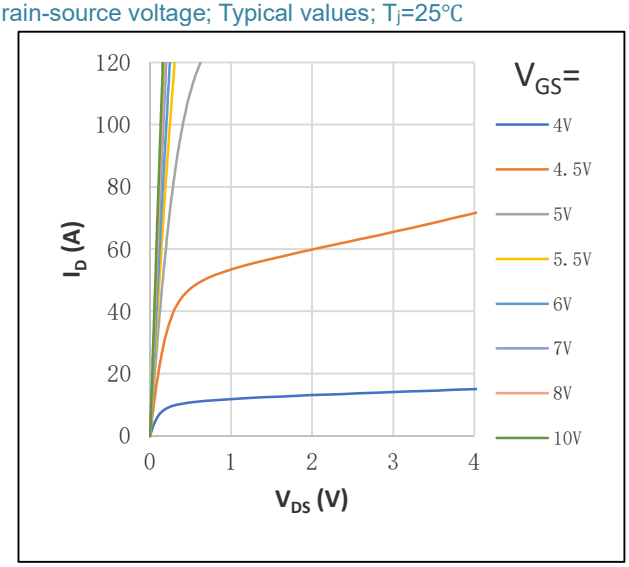
●Fig.1 Gate-source voltage as a function of gate charge; Typical values; T_j=25℃



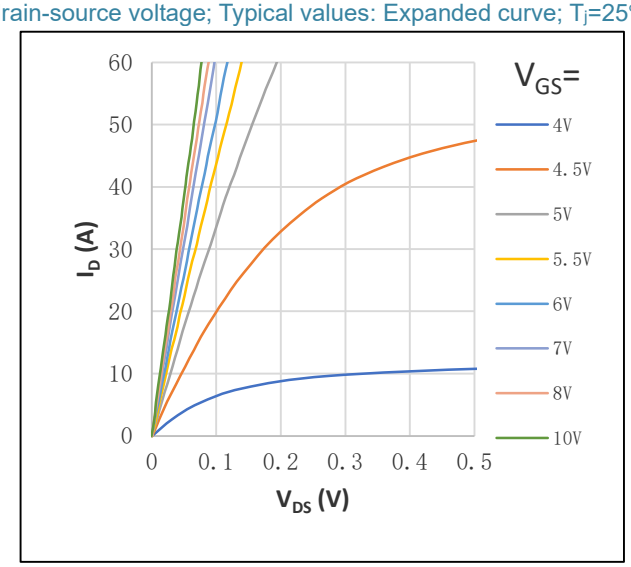
●Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; T_j=25℃



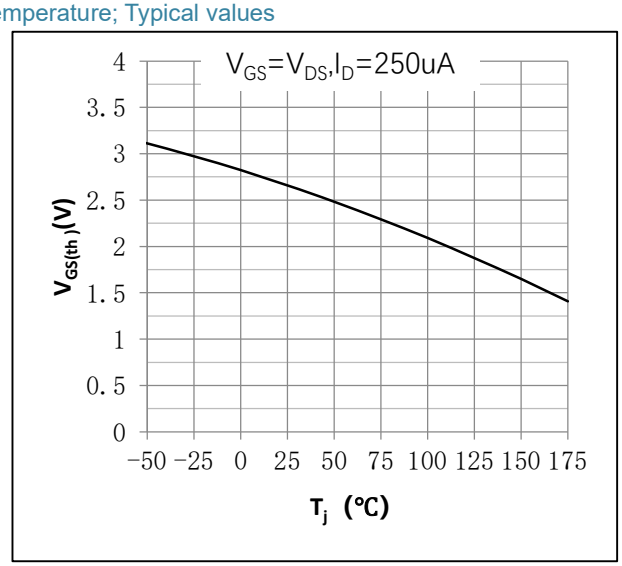
●Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; T_j=25℃



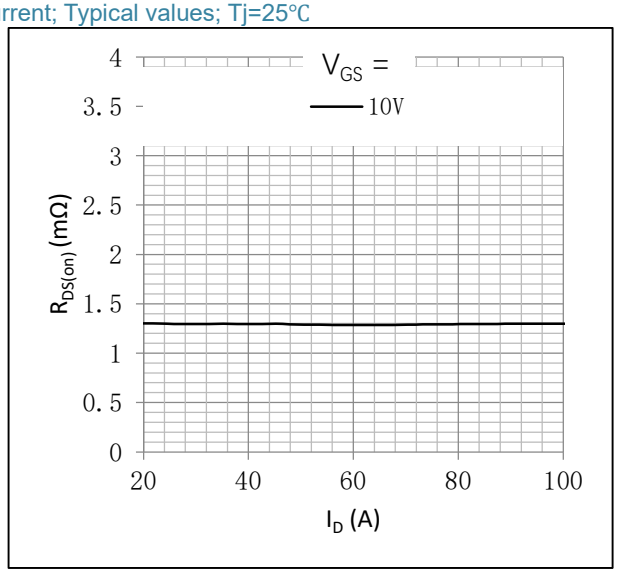
●Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; T_j=25℃



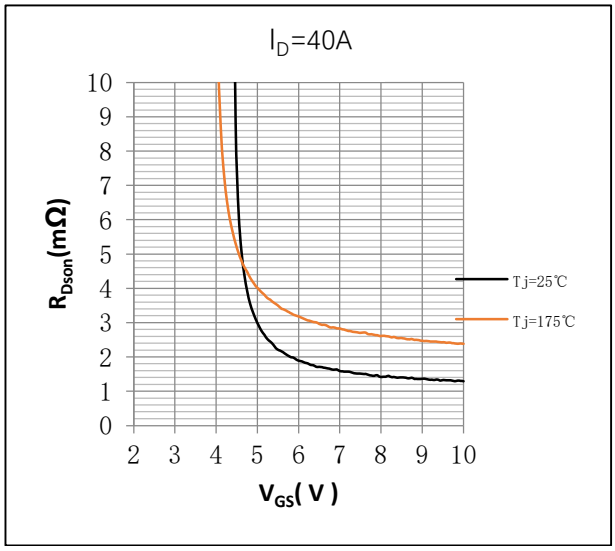
●Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



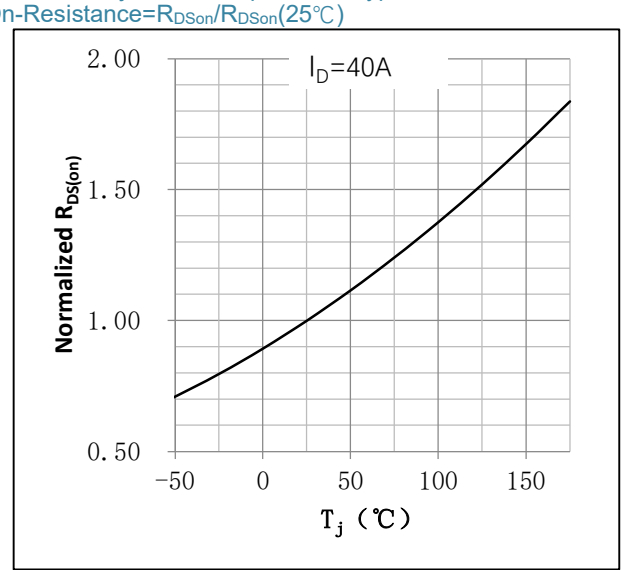
●Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; Tj=25℃



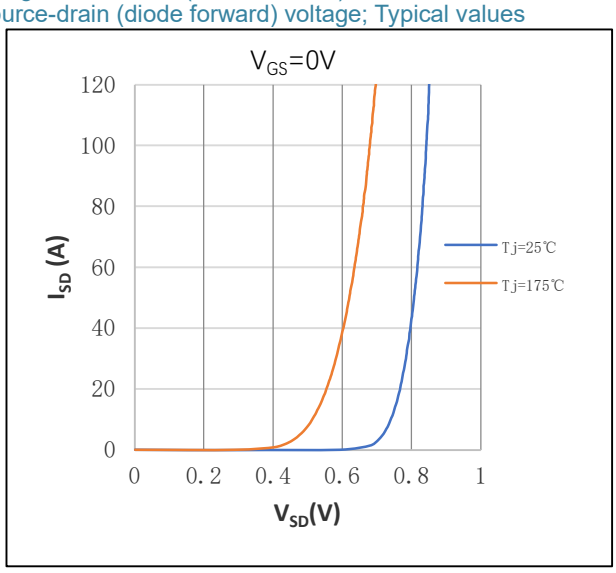
●Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



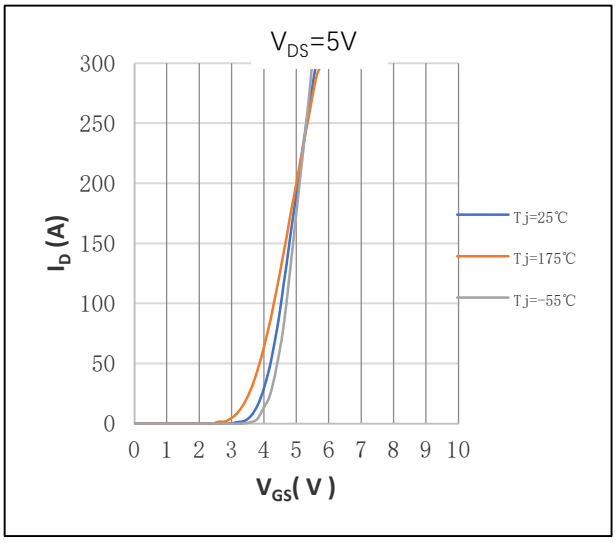
●Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance=R_{DSon}/R_{DSon}(25℃)



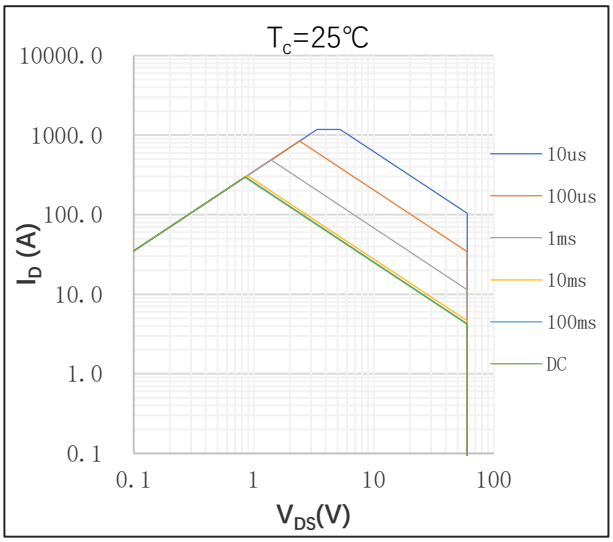
●Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



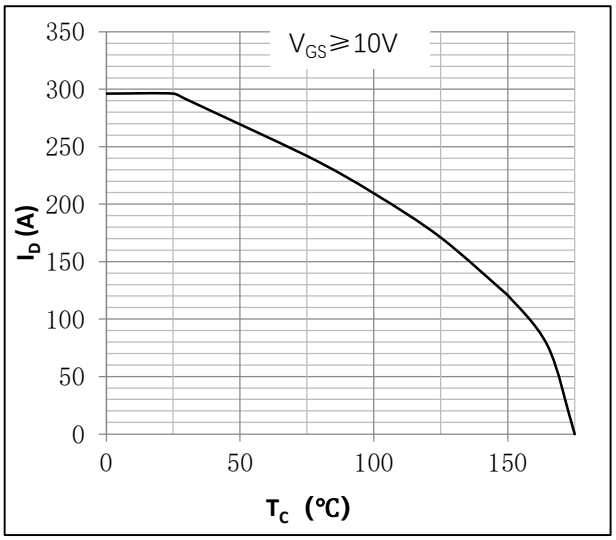
●Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



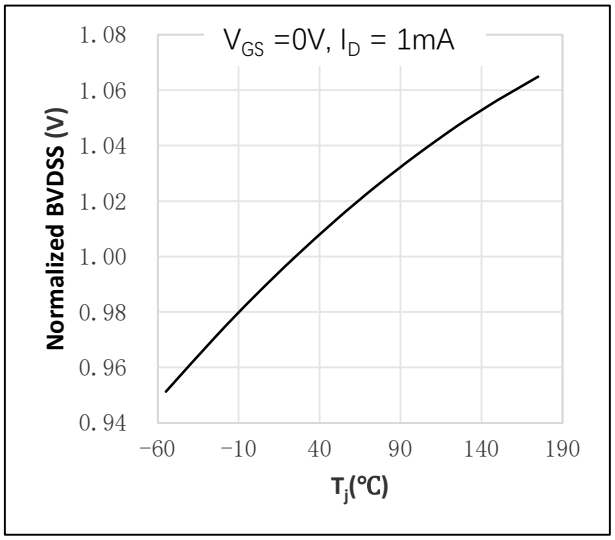
●Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



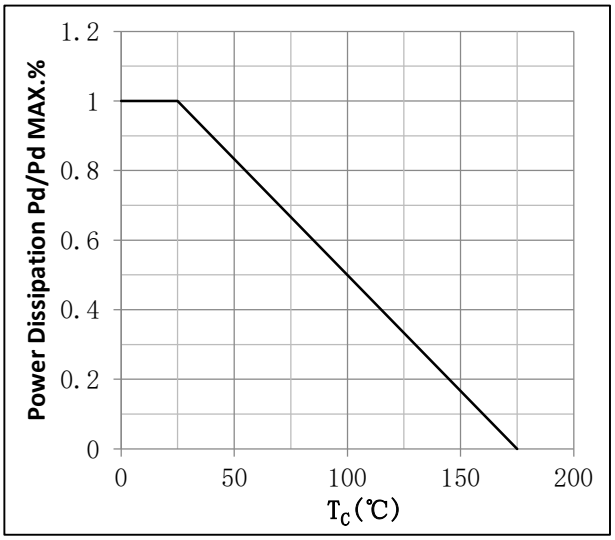
●Fig.12 Continuous drain current as a function of case temperature[2];Calculative values



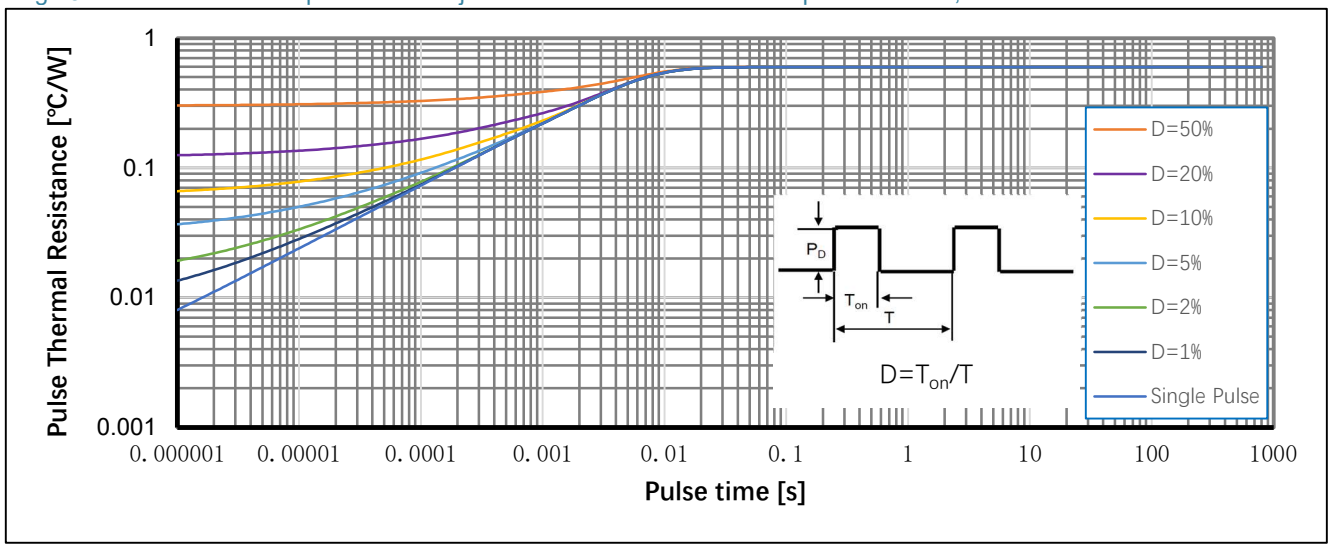
●Fig.13 Drain-source breakdown voltage as a function of junction temperature; Typical values Normalized BV_{DSS} =BV_{DSS}/BV_{DSS}(25℃)



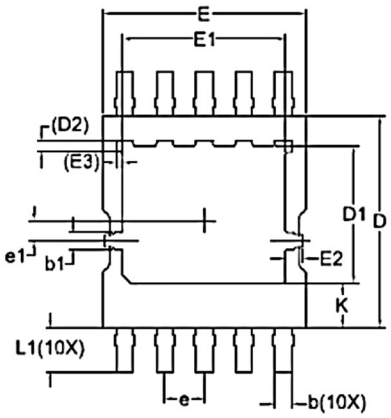
●Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation =P_d/P_d(25℃)



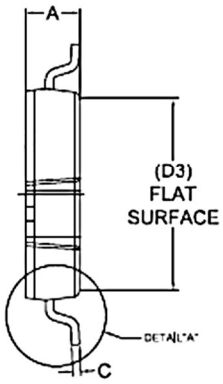
●Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values



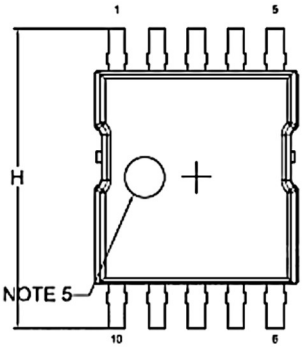
●Package Outline



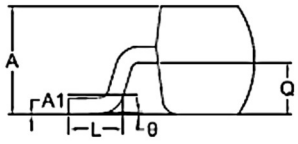
TOP VIEW



SIDE VIEW



BOTTOM VIEW



DEDAIL"A"
(2:1)

MILLIMETERS			
DIM	MIN	NOM	MAX
A	1.25	1.35	1.45
A1	-0.05	0	0.075
b	0.36	0.41	0.46
b1	0.30	0.40	0.50
c	0.16	0.20	0.26
D	5.20	5.30	5.40
D1	3.35	3.45	3.55
D2	0.29 REF		
D3	4.82 REF		
E	5.00	5.10	5.20
E1	4.02	4.12	4.22
E2	0.30	0.44	0.50
E3	0.14 REF		
e	1.00 BSC		
e1	0.50 BSC		
K	1.00	1.10	1.20
H	7.30	7.50	7.70
L	0.49	0.69	0.89
L1	0.90	1.10	1.30
Q	0.60	0.65	0.70
θ	0°	2.5°	5°

Note

①Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

②Practically the current will be limited by PCB, thermal design and operating temperature. V_{GS}=10V.

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●Revision History

Version	Date	Change
A	2025/12/29	New