

● General Description

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

● Features

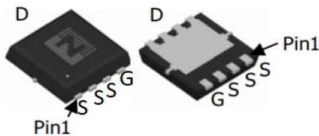
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low thermal resistance
- AEC-Q101 qualified

● Application

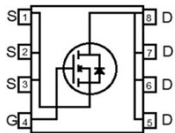
- BLDC motor driver
- DC-DC
- Load switch



● Product Summary



DFN3*3



$V_{DS}=60V$

$R_{DS(ON)}=41.7mR$

$I_D=16A$



● Ordering Information

Part NO.	ZMA430N06M
Marking	430N06
Packing information	REEL TAPE
Basic ordering unit (pcs)	5000

● Absolute Maximum Ratings ($T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}	$25^{\circ}C \leq T_J \leq 175^{\circ}C$	-	60	V
Gate-source voltage ^①	V_{GS}	DC; $-55^{\circ}C \leq T_J \leq 175^{\circ}C$	-20	20	V
Continuous drain current	I_D	$V_{GS}=10V, T_C=25^{\circ}C$	-	16	A
	I_D	$V_{GS}=10V, T_C=75^{\circ}C$	-	13	A
	I_D	$V_{GS}=10V, T_C=100^{\circ}C$	-	11	A
Pulsed drain current	I_{DM}	Pulsed; $t_p \leq 10 \mu s; T_C = 25^{\circ}C$;	-	50	A
Diode continuous current	I_S	$V_{GS}=0V, T_C=25^{\circ}C$	-	16	A
Diode pulse current	$I_{S,pulse}$	Pulsed; $t_p \leq 10 \mu s; T_C = 25^{\circ}C$;	-	50	A
Total power dissipation	P_D	$V_{GS} > 6V, T_C=25^{\circ}C$	-	30	W
Total power dissipation	P_D	$V_{GS} > 6V, T_A=25^{\circ}C$	-	2.5	W
Operating junction temperature	T_J		-55	175	$^{\circ}C$
Storage temperature	T_{STG}		-55	175	$^{\circ}C$
Single pulse avalanche energy	E_{AS}	$L=0.1mH, V_{GS}=10V, R_g=25\Omega$	-	8	mJ

Single pulse avalanche energy	E_{AS}	$L=0.5\text{mH}$, $V_{GS}=10\text{V}$, $R_g=25\Omega$	-	20	mJ
ESD level (HBM)	CLASS 1B				

● Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	5	$^{\circ}\text{C/W}$
Thermal resistance, junction - ambient	$R_{thJA}^{(2)}$	-	-	60	$^{\circ}\text{C/W}$
Soldering temperature	T_{sold}	-	-	260	$^{\circ}\text{C}$

● Electronic Characteristics ($T_j=25^{\circ}\text{C}$, unless otherwise specified)

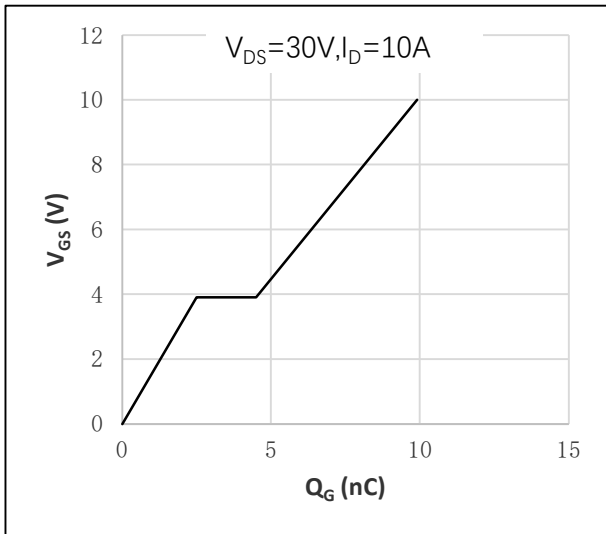
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$, $T_j=25^{\circ}\text{C}$	60	-	-	V
		$V_{GS}=0\text{V}$, $I_D=1\text{mA}$, $T_j=-55^{\circ}\text{C}$	55.7	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$, $T_j=25^{\circ}\text{C}$	1.4	1.7	2.5	V
		$V_{GS}=V_{DS}$, $I_D=1\text{mA}$, $T_j=-55^{\circ}\text{C}$	-	-	2.6	V
		$V_{GS}=V_{DS}$, $I_D=1\text{mA}$, $T_j=175^{\circ}\text{C}$	0.9	-	-	V
Drain-source leakage current	I_{DSS}	$V_{GS}=0\text{V}$, $V_{DS}=60\text{V}$, $T_j=25^{\circ}\text{C}$	-	-	1	μA
		$V_{GS}=0\text{V}$, $V_{DS}=60\text{V}$, $T_j=175^{\circ}\text{C}$	-	-	500	μA
Gate- source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$	-	-	± 100	nA
Static drain-source on resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}$, $I_D=10\text{A}$, $T_j=25^{\circ}\text{C}$	-	41.7	52.1	m Ω
		$V_{GS}=10\text{V}$, $I_D=10\text{A}$, $T_j=175^{\circ}\text{C}$	-	96.5	-	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=8\text{A}$, $T_j=25^{\circ}\text{C}$	-	55.4	69.3	m Ω
Forward transconductance	g_{FS}	$V_{DS}=5\text{V}$, $I_D=10\text{A}$	-	8	-	S
Diode forward voltage	V_{FSD}	$V_{GS}=0\text{V}$, $I_{SD}=10\text{A}$	-	0.9	1.3	V

● Dynamic characteristics ($T_j=25^{\circ}\text{C}$, unless otherwise specified)

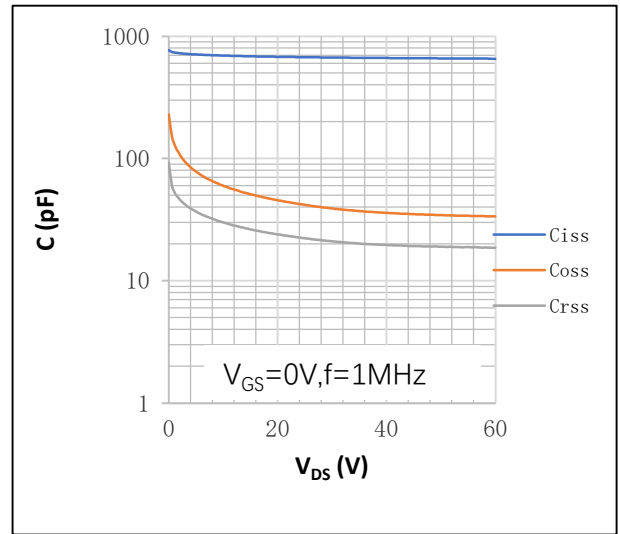
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1\text{MHz}$, $V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$	-	672	-	pF
Output capacitance	C_{oss}		-	39	-	pF
Reverse transfer capacitance	C_{rss}		-	21	-	pF
Gate resistance	R_g	$f=1\text{MHz}$	-	2	-	Ω
Total gate charge	Q_g	$V_{DD}=30\text{V}$, $I_D=10\text{A}$, $V_{GS}=10\text{V}$	-	9.9	-	nC
	$Q_g(4.5\text{V})$		-	5.0	-	nC
Gate-source charge	Q_{gs}		-	2.5	-	nC
Gate-drain charge	Q_{gd}		-	2	-	nC

Turn-on delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=30V,$ $R_G=3.3\Omega, I_D=10A$	-	2	-	ns
Turn-on rise time	t_r		-	3	-	ns
Turn-off delay time	$t_{D(off)}$		-	10	-	ns
Turn-off fall time	t_f		-	7.5	-	ns
Reverse recovery time	t_{rr}	$V_{DD}=30V, di_S/dt = 100A/us,$	-	29	-	ns
Reverse recovery charge	Q_{rr}	$I_S=10A$	-	28	-	nC

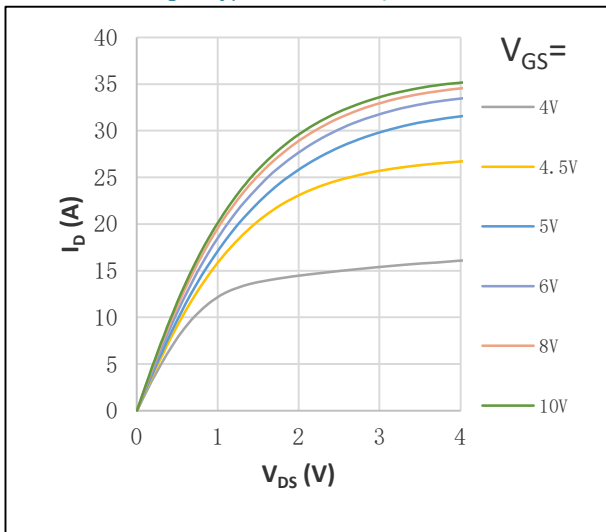
● Fig.1 Gate-source voltage as a function of gate charge; Typical values; $T_j=25^\circ\text{C}$



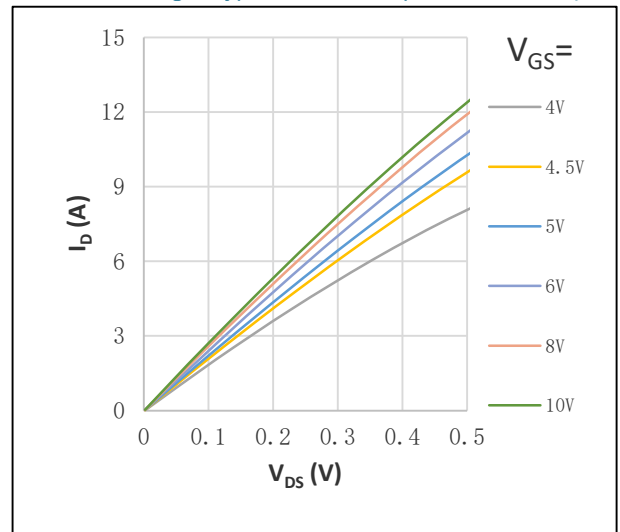
● Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; $T_j=25^\circ\text{C}$



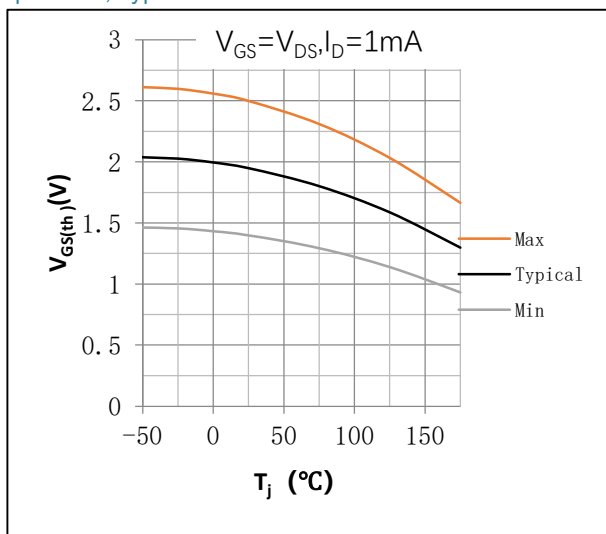
● Fig.3 Output characteristics: drain current as a function of drain-source voltage; Typical values; $T_j=25^\circ\text{C}$



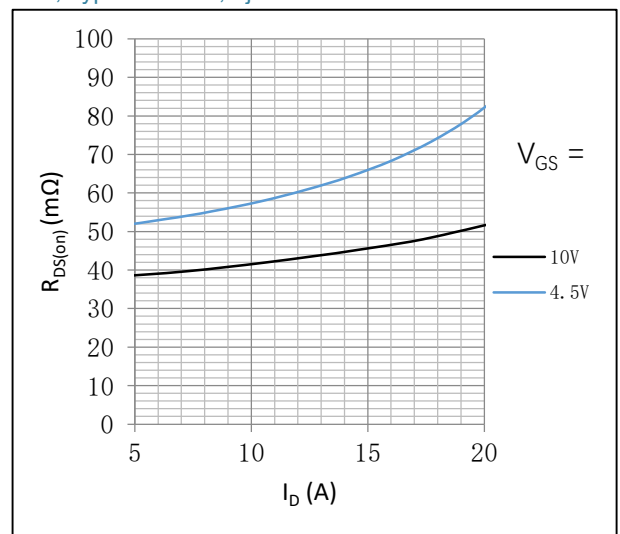
● Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: Expanded curve; $T_j=25^\circ\text{C}$



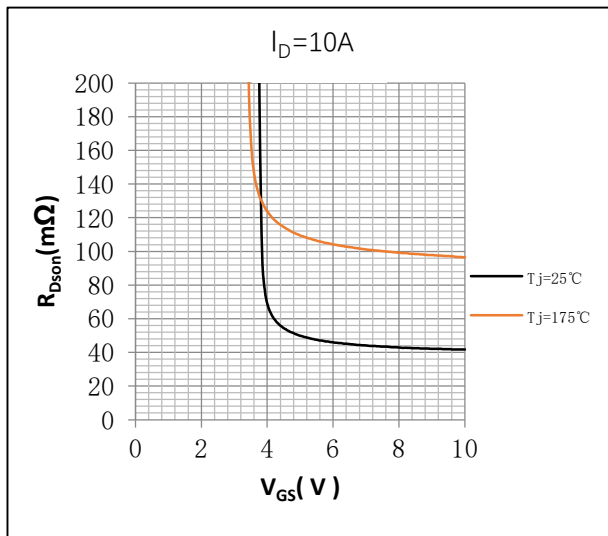
● Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical/Min/Max values



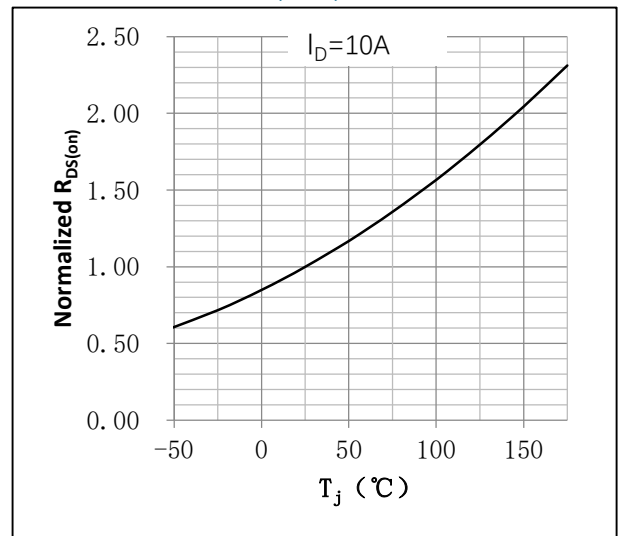
● Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; $T_j=25^\circ\text{C}$



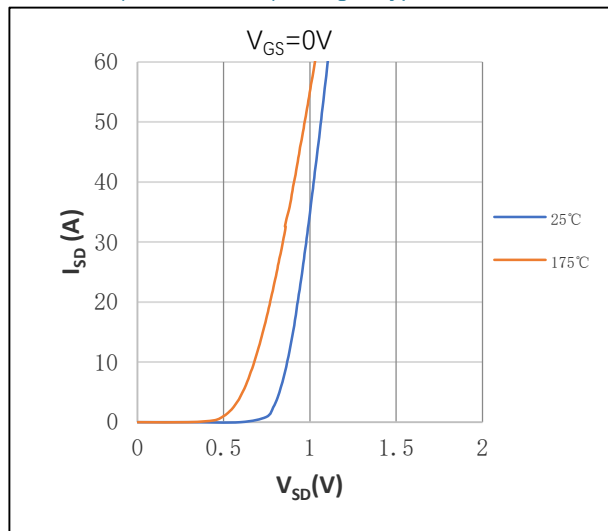
● Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



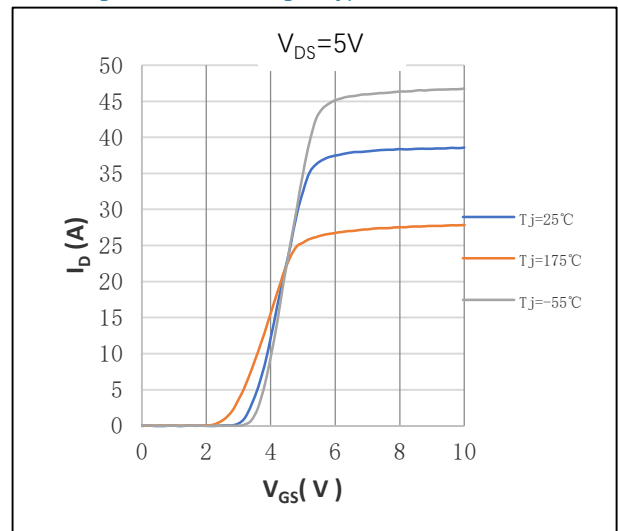
● Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance = $R_{DS(on)}/R_{DS(on)}(25^{\circ}\text{C})$



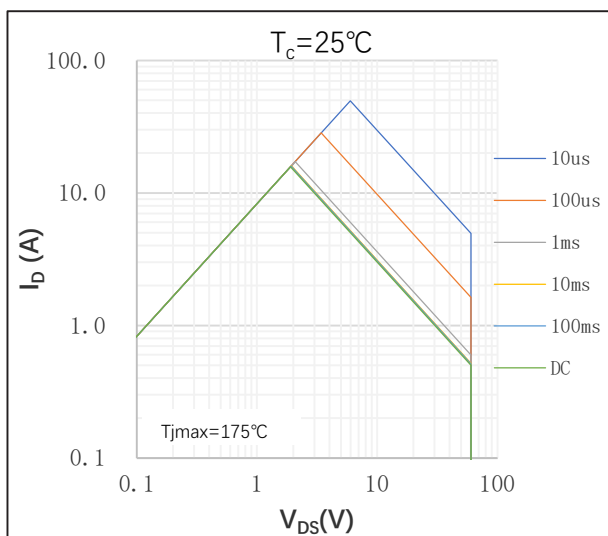
● Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



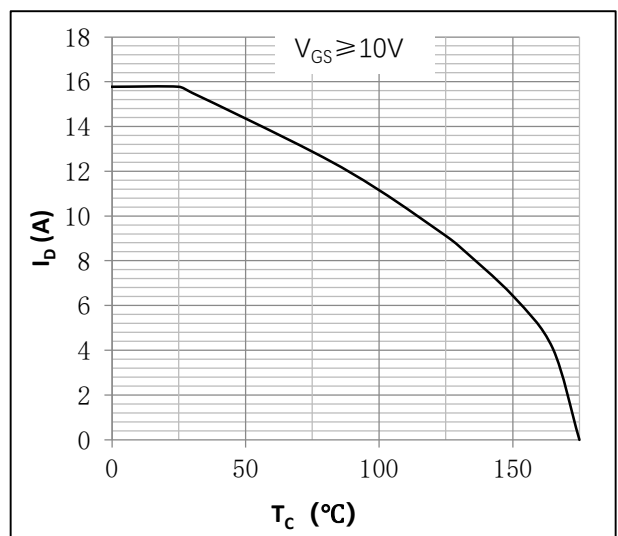
● Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



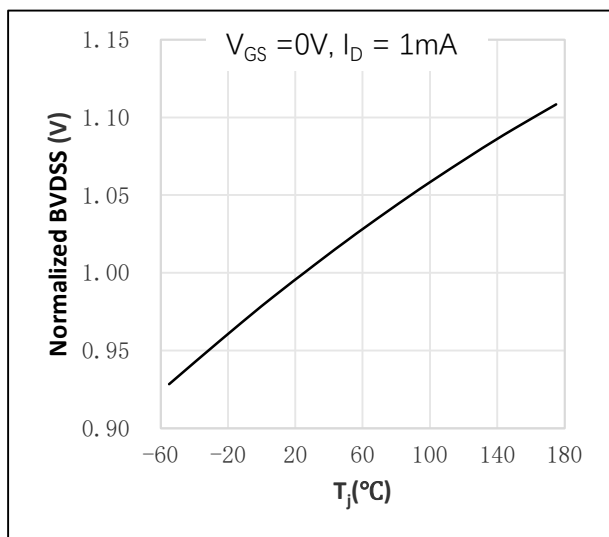
● Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



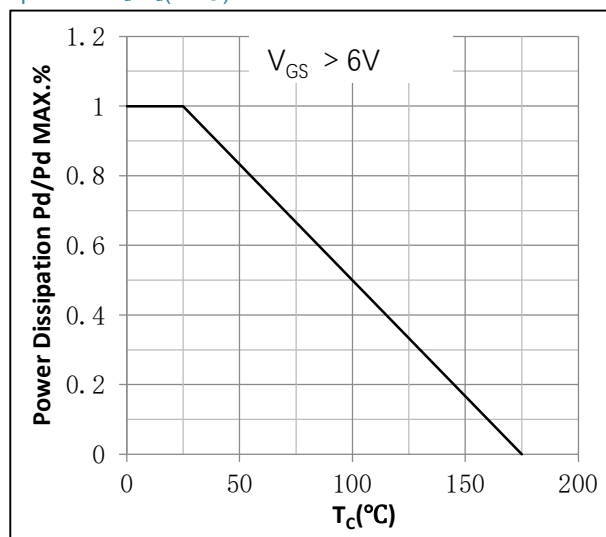
● Fig.12 Continuous drain current as a function of case temperature³; Calculative values



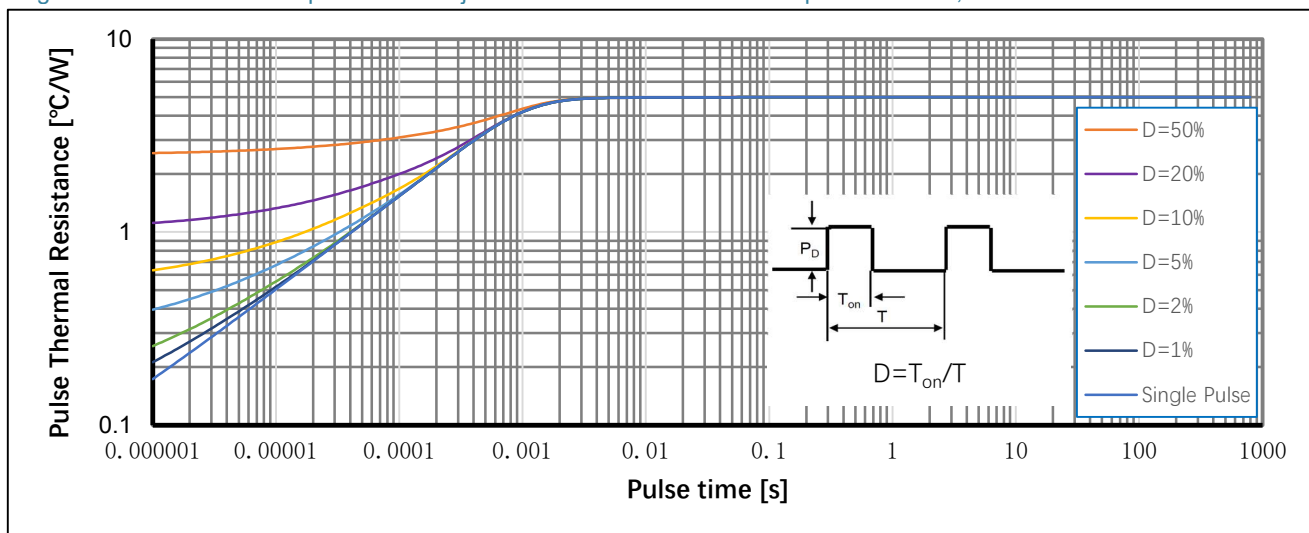
● Fig.13 Drain-source breakdown voltage as a function of junction temperature; Normalized values



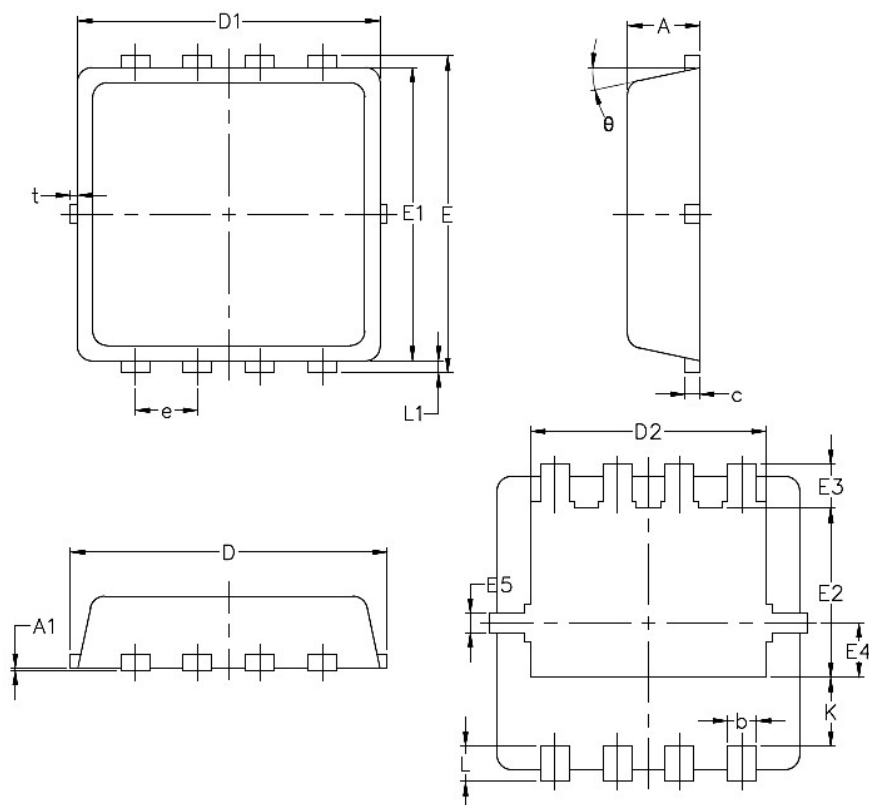
● Fig.14 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation = $P_d/P_d(25^{\circ}C)$



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



● Package Outline



SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.56	1.76	1.96
E3	0.305	0.455	0.625
E4	0.365	0.565	0.765
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.62	0.72	0.92
L	0.265	0.365	0.465
L1	0.06	0.125	0.20
t	0	0.075	0.13
θ	10°	12°	14°

Note:

1. Refer to JEDEC MO-240.

● Note

- ① Pulse : $V_{GS}=+20V/-20V$, Duty cycle=50%, $T_j=175^{\circ}C$, $t=1000$ hours; For DC, the following test conditions can be passed: $V_{GS}=+20V/-10V$, $T_j=175^{\circ}C$, $t=1000$ hours;
- ② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;
- ③ Practically 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	2021/5/10	New
B	2022/2/5	Add Disclaimer.
C	2022/9/3	1.Add Reach, HF figure; 2.ID modified.
D	2025/6/7	Correct ESD level.
E	2026/8/11	Apply new datasheet format.