



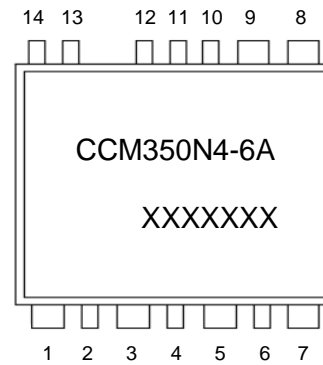
# DPIM 23\*22 MOSFET MODULE

## CCM350N4-6A Full bridge N Channel MOSFET

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
40 V	1.5mΩ@10V	350A 200A (package limited)

### FEATURE

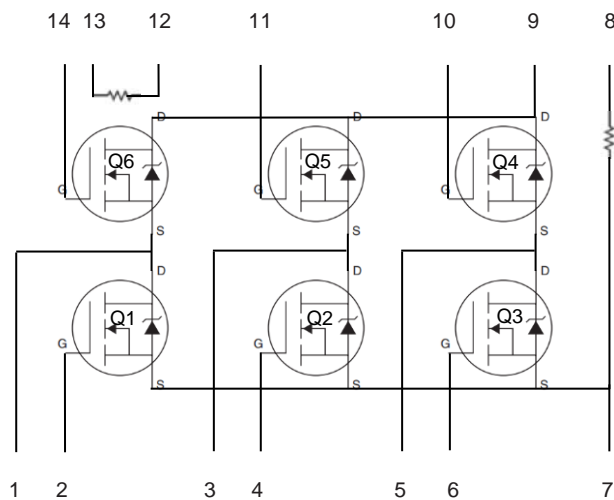
- Split Gate Trench Technology
- Low RDS(ON)
- Low Gate Charge
- Low Gate Resistance
- Current acquisition
- Temperature acquisition
- AEC Q101 qualified



### APPLICATION

- motor control
- Full bridge module

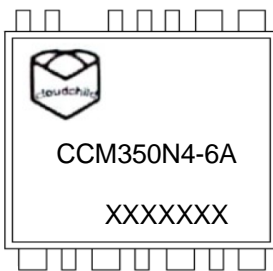
### Circuit Diagram



## Pin Definition

Number	Pin Definition	Remark	Number	Pin Definition	Remark
1	A	A phase output	8	Is	Current acquisition port
2	G1	Lower bridge Q1 gate	9	D	Upper bridge Q4/Q5/Q6 drain electrode
3	B	B phase output	10	G4	Upper bridge Q4 gate
4	G2	Lower bridge Q2 gate	11	G5	Upper bridge Q5 gate
5	C	C phase output	12	T	Temperature acquisition port
6	G3	Lower bridge Q3 gate	13	T	Temperature acquisition port
7	S	Lower bridge Q1/Q2/Q3/ source electrode	14	G6	Upper bridge Q6 gate

## MARKING



CCM350N4-6A =Part No.  
XXXXXXX = Code.

## ABSOLUTE MAXIMUM RATINGS (Ta=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current <sup>1</sup>	$I_D$	350 200 (package limited)	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	800	A
Single Pulse Avalanche Energy <sup>3</sup>	EAS	900	mJ
Total Power Dissipation <sup>1</sup>	$P_D$	250	W
Thermal Resistance from Junction to Case <sup>1</sup>	$R_{\theta JC}$	0.6	°C/W
Thermal Resistance from Junction to Ambient <sup>1</sup>	$R_{\theta JA}$	60	°C/W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~ +175	°C
Soldering Temperature , for 10S(1.6mm from case)	-	260	°C

### Notes:

1.  $T_C=25^\circ\text{C}$  Limited only by maximum temperature allowed.
2.  $P_W \leq 10\mu\text{s}$ , Duty cycle  $\leq 1\%$ .
3. EAS condition:  $V_{DD}=20\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $I_D=60\text{A}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\Omega$  Starting  $T_J=25^\circ\text{C}$ .

### ATTENTION

This is an electrostatic sensitive device. Please pay attention to ESD protection during welding.  
It need to turn on the ion fan and take grounding measures when contacting the product.

# MOSFET ELECTRICAL CHARACTERISTICS ( $T_J = 25^{\circ}\text{C}$ )

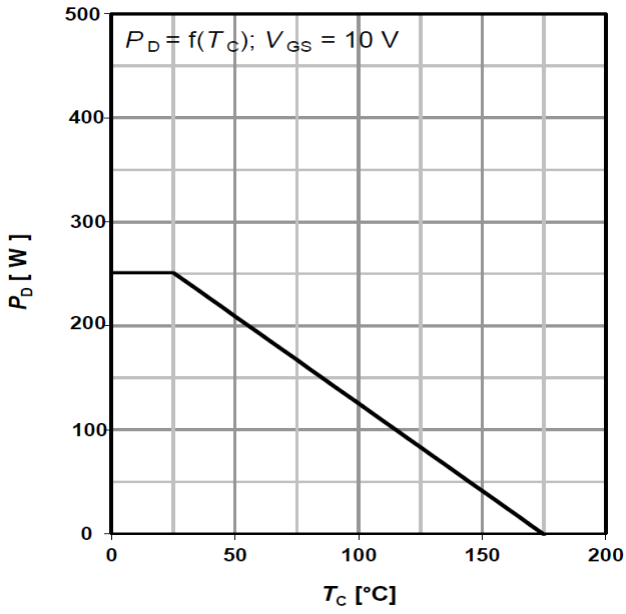
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Off characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 40V, V_{GS} = 0V$			1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$			$\pm 100$	nA
<b>On characteristics<sup>4</sup></b>						
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	3.0	4.0	V
Static drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$		1.5	1.6	m $\Omega$
Forward transconductance	$g_{fs}$	$V_{DS} = 10V, I_D = 10A$		72		S
<b>Dynamic characteristics<sup>34</sup></b>						
Input capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1MHz$		6570		pF
Output capacitance	$C_{oss}$			1580		
Reverse transfer capacitance	$C_{rss}$			137		
Gate resistance	$R_g$	$f = 1MHz$		3.9		$\Omega$
<b>Switching characteristics<sup>34</sup></b>						
Total gate charge	$Q_g$	$V_{GS} = 10V, V_{DD} = 20V,$ $I_D = 20A$		44		nC
Gate-source charge	$Q_{gs}$			20		
Gate-drain charge	$Q_{gd}$			12		
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 20V, R_L = 1\Omega,$ $V_{GS} = 10V, R_G = 3\Omega$		28		ns
Turn-on rise time	$t_r$			26		
Turn-off delay time	$t_{d(off)}$			46		
Turn-off fall time	$t_f$			32		
<b>Drain-Source Diode Characteristics</b>						
Drain-source diode forward voltage <sup>4</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 1A$			1.0	V
Continuous drain-source diode forward Current <sup>1</sup>	$I_S$	-			200	A
Pulsed drain-source diode forward current <sup>2</sup>	$I_{SM}$	-			800	A
Reverse recovery time	$T_{rr}$	$I_F = 50A, di/dt = 100A/\mu s,$ $V_R = 20V$		50		ns
Reverse recovery charge	$Q_{rr}$			52		nC
<b>Temperature acquisition</b>						
Thermistor	R	25 $^{\circ}\text{C}$	9.99	10	10.01	K $\Omega$
	B	25/50 ( $^{\circ}\text{C}$ )	3346	3380	3414	K
<b>Current acquisition</b>						
Resistance	R	/		1		m $\Omega$
Accuracy	F	/	-1%		+1%	/
Rated power	P	/		3	5	W
Max. Rated Current	I	/		122	158	A
Temperature Coefficient	TCR	/	20		50	ppm/ $^{\circ}\text{C}$
Inductance	L	/			10	nH

Note :

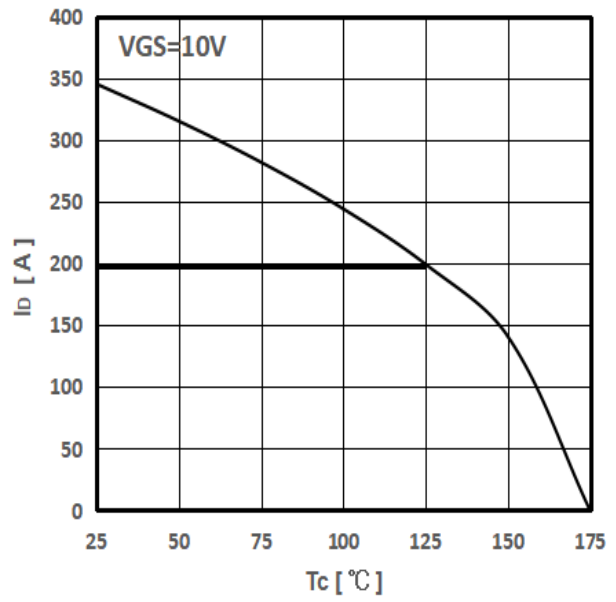
1.  $T_C = 25^{\circ}\text{C}$  Limited only by maximum temperature allowed.
2.  $P_W \leq 10\mu s$ , Duty cycle  $\leq 1\%$ .
3. Guaranteed by design, not subject to production.
4. Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

# Typical Characteristics

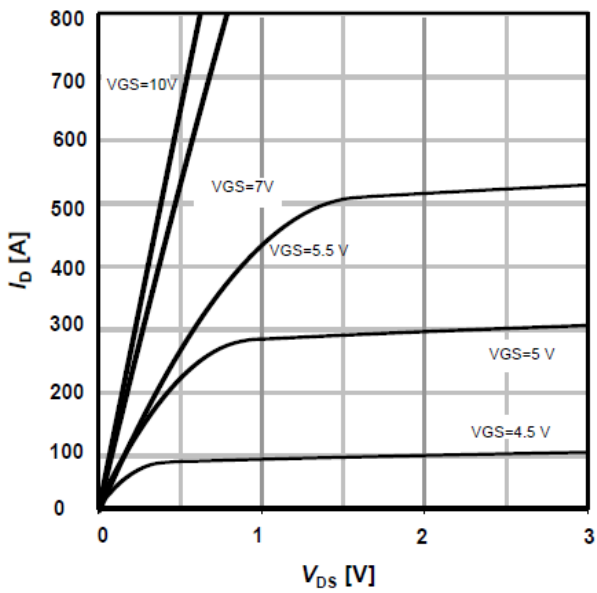
PD -- Tc



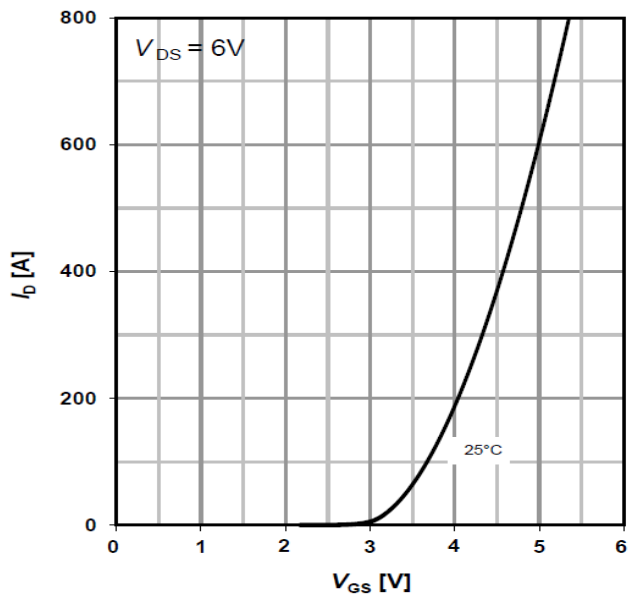
ID -- Tc



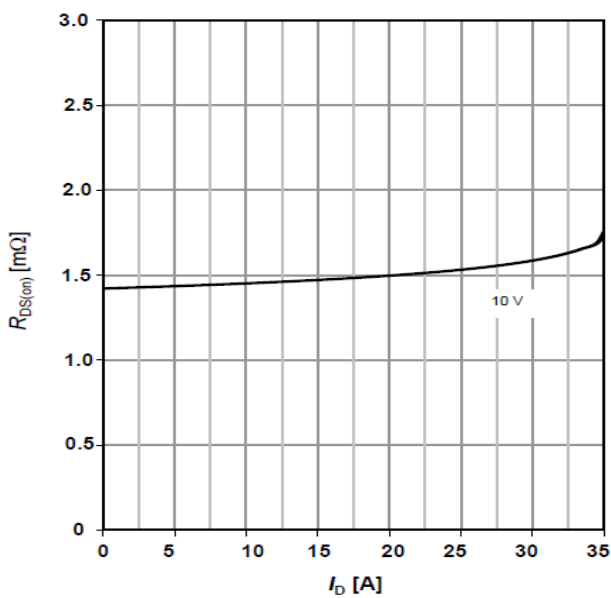
ID -- VDS



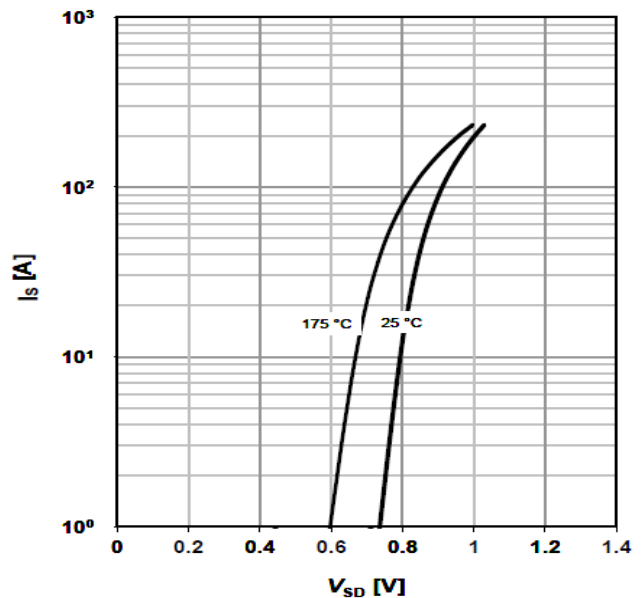
ID -- VGS



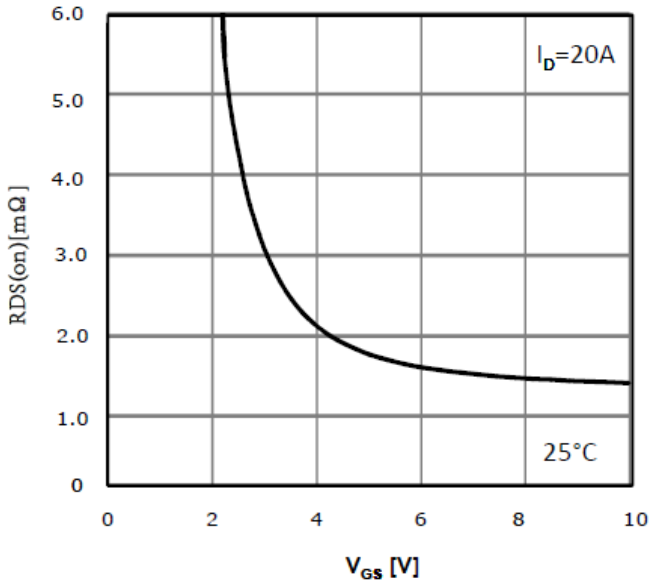
RDS(on) -- ID



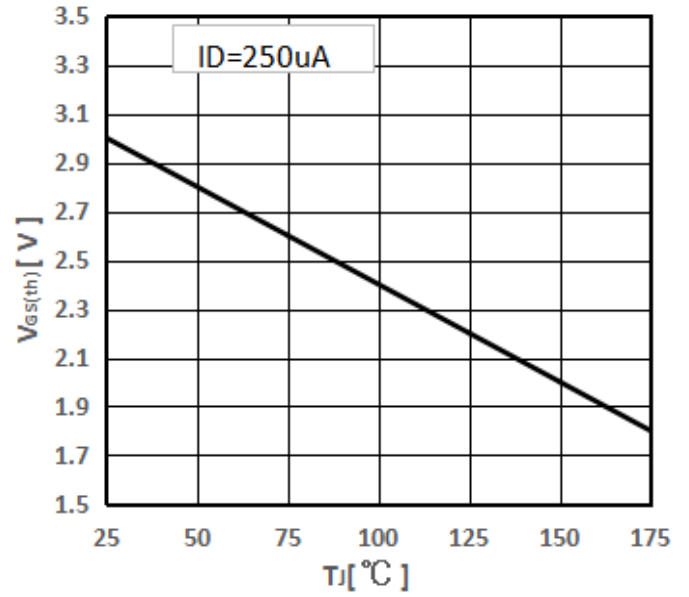
IS -- VSD



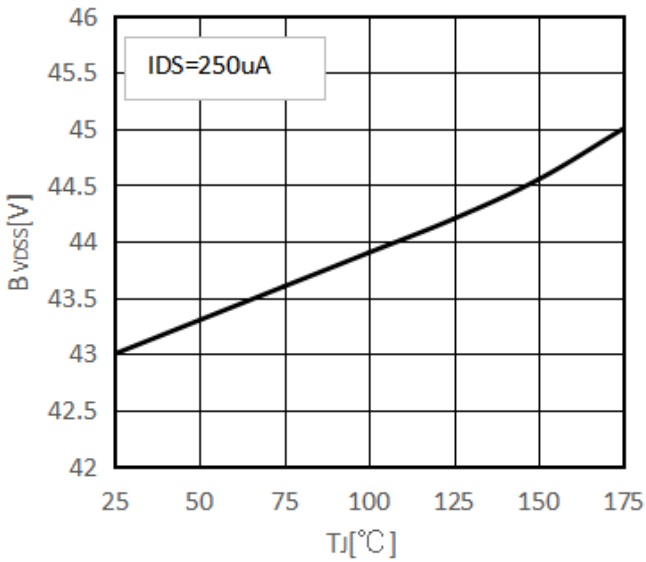
### RDS(on) -- VGS



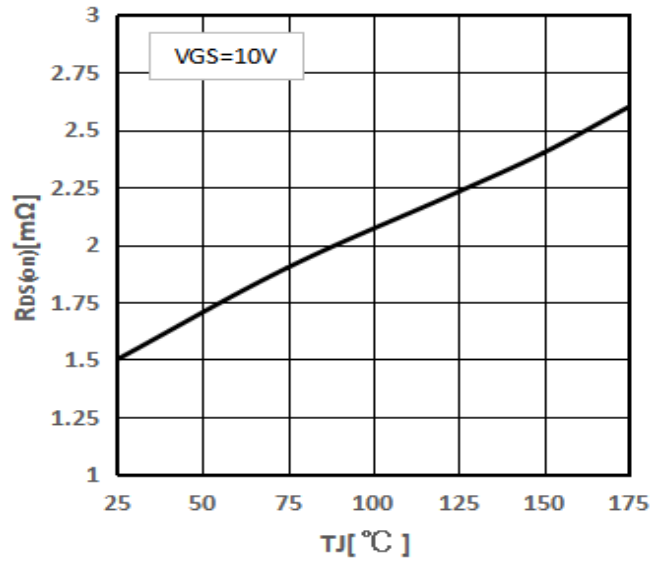
### Threshold Voltage



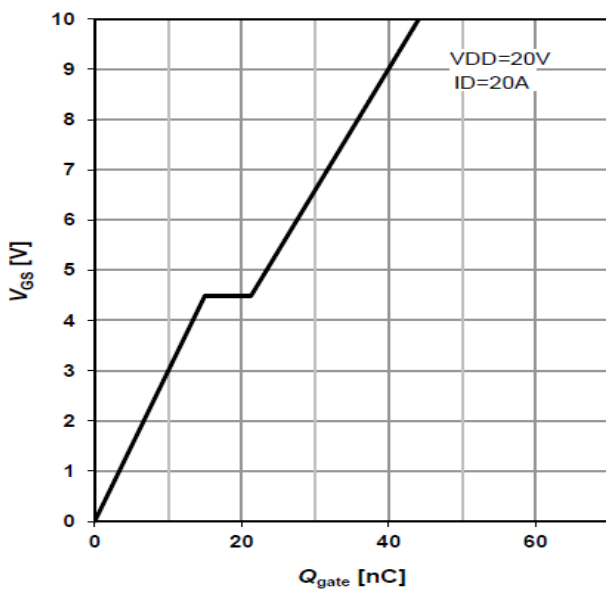
### Drain-source breakdown voltage



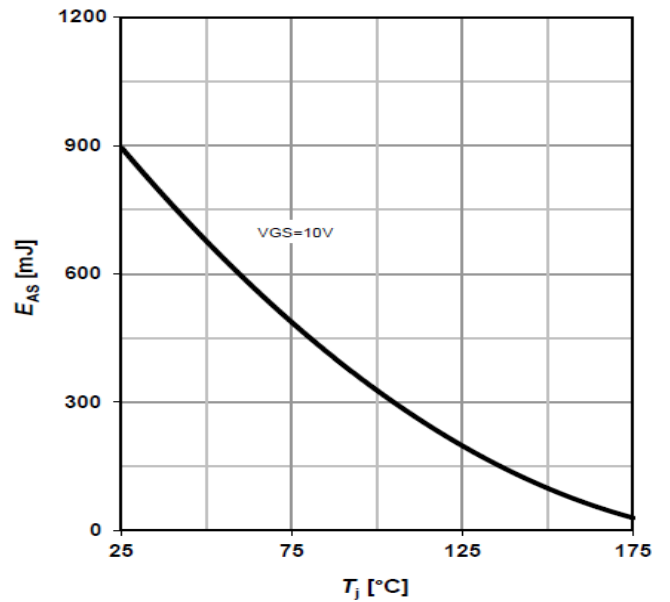
### RDS (on) -- TJ



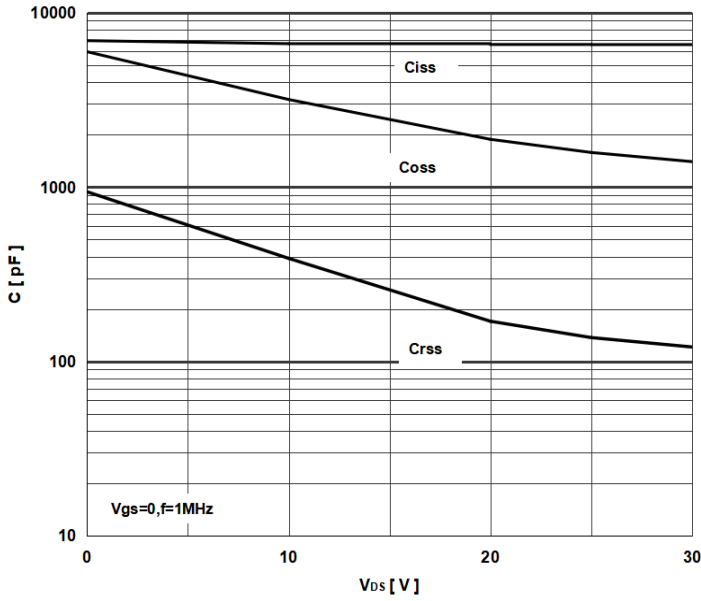
### Typ.gate charge



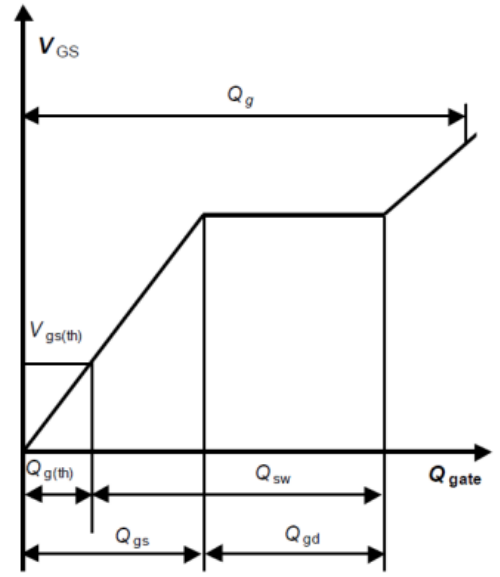
### Avalanche energy



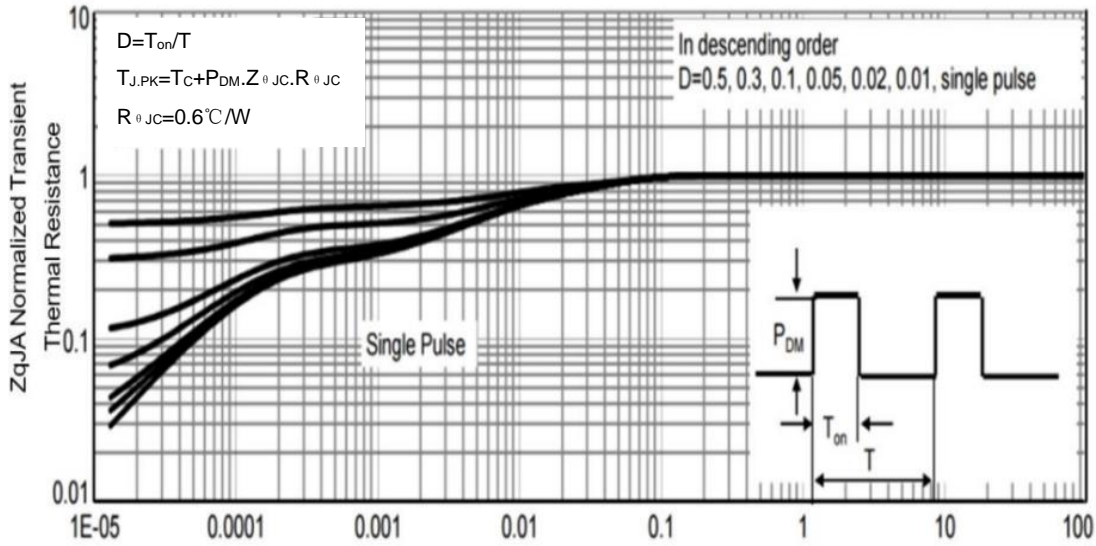
### Typ. capacitance



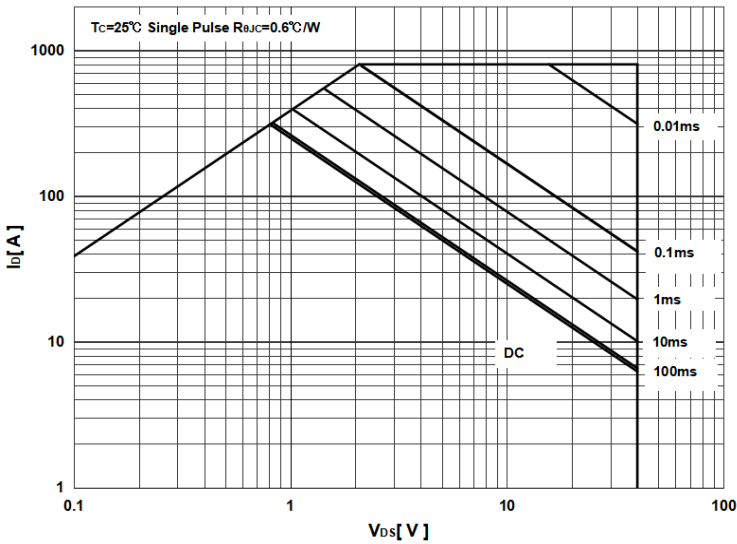
### Gate charge waveforms



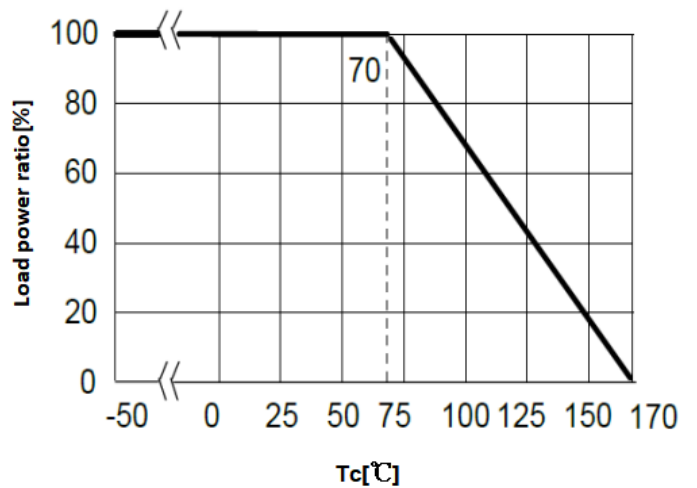
### Normalized Thermal Transient Impedance



### Maximum Forward Biased Safe Operating Area



### Power curve of Current acquisition resistance



## Comparison table of temperature resistance value of thermistor

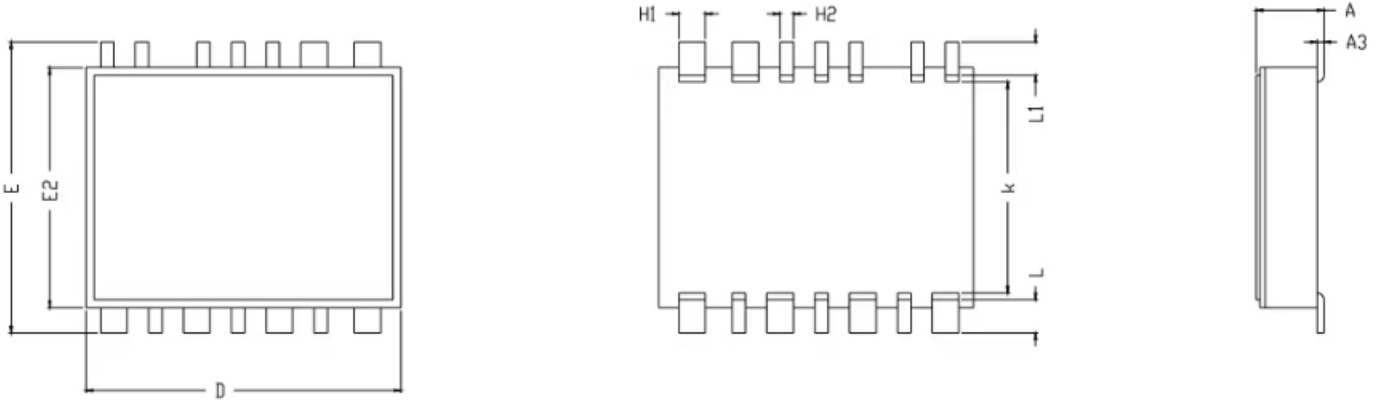
温度 (°C)	最小值 (kΩ)	标准值 (kΩ)	最大值 (kΩ)	温度 (°C)	最小值 (kΩ)	标准值 (kΩ)	最大值 (kΩ)
-40	238.0	248.3	258.9	44	4.930	5.015	5.100
-39	223.6	233.1	243.0	45	4.764	4.847	4.931
-38	210.3	219.0	228.2	46	4.604	4.686	4.769
-37	197.8	205.9	214.3	47	4.450	4.531	4.612
-36	186.1	193.6	201.5	48	4.302	4.382	4.462
-35	175.2	182.2	189.5	49	4.161	4.239	4.318
-34	165.1	171.6	178.3	50	4.024	4.101	4.179
-33	155.6	161.6	167.8	51	3.893	3.969	4.046
-32	146.7	152.3	158.1	52	3.767	3.842	3.917
-31	138.4	143.6	148.9	53	3.646	3.719	3.794
-30	130.6	135.5	140.4	54	3.529	3.601	3.675
-29	123.4	127.8	132.4	55	3.417	3.488	3.560
-28	116.6	120.7	125.0	56	3.309	3.379	3.450
-27	110.2	114.0	118.0	57	3.205	3.274	3.343
-26	104.2	107.8	111.5	58	3.105	3.172	3.241
-25	98.56	101.9	105.3	59	3.008	3.075	3.142
-24	93.29	96.39	99.59	60	2.916	2.981	3.047
-23	88.34	91.22	94.19	61	2.826	2.890	2.956
-22	83.68	86.37	89.13	62	2.740	2.803	2.867
-21	79.31	81.81	84.38	63	2.657	2.719	2.782
-20	75.19	77.52	79.92	64	2.577	2.638	2.700
-19	71.32	73.49	75.72	65	2.499	2.559	2.620
-18	67.68	69.70	71.78	66	2.425	2.484	2.544
-17	64.25	66.13	68.07	67	2.353	2.411	2.470
-16	61.01	62.77	64.57	68	2.284	2.341	2.399
-15	57.97	59.61	61.29	69	2.217	2.273	2.330
-14	55.09	56.62	58.19	70	2.152	2.207	2.263
-13	52.38	53.81	55.27	71	2.090	2.144	2.199
-12	49.83	51.16	52.52	72	2.030	2.083	2.137
-11	47.41	48.65	49.92	73	1.972	2.024	2.077
-10	45.13	46.29	47.48	74	1.916	1.967	2.019
-9	42.98	44.06	45.16	75	1.861	1.912	1.963
-8	40.94	41.95	42.98	76	1.809	1.858	1.909
-7	39.01	39.96	40.92	77	1.758	1.807	1.856
-6	37.19	38.07	38.97	78	1.710	1.757	1.806
-5	35.47	36.29	37.13	79	1.662	1.709	1.757
-4	33.83	34.60	35.39	80	1.617	1.662	1.709
-3	32.29	33.01	33.74	81	1.572	1.617	1.664
-2	30.82	31.49	32.18	82	1.530	1.574	1.619
-1	29.44	30.06	30.70	83	1.488	1.532	1.576
0	28.12	28.70	29.30	84	1.448	1.491	1.535



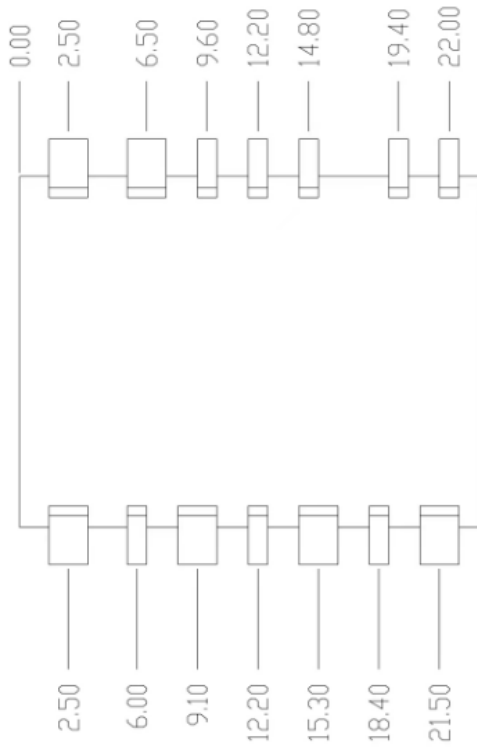
1	26.87	27.42	27.97	85	1.409	1.451	1.494
2	25.69	26.20	26.71	86	1.372	1.413	1.455
3	24.56	25.04	25.52	87	1.336	1.376	1.418
4	23.49	23.94	24.39	88	1.300	1.340	1.381
5	22.48	22.90	23.32	89	1.266	1.305	1.346
6	21.52	21.91	22.30	90	1.233	1.272	1.311
7	20.60	20.96	21.33	91	1.201	1.239	1.278
8	19.73	20.07	20.41	92	1.171	1.208	1.246
9	18.90	19.22	19.54	93	1.141	1.177	1.214
10	18.12	18.41	18.71	94	1.111	1.147	1.184
11	17.37	17.64	17.92	95	1.083	1.118	1.155
12	16.65	16.91	17.17	96	1.056	1.091	1.126
13	15.97	16.21	16.45	97	1.030	1.063	1.098
14	15.32	15.55	15.77	98	1.004	1.037	1.072
15	14.71	14.92	15.13	99	0.9790	1.012	1.046
16	14.12	14.31	14.51	100	0.9548	0.9870	1.020
17	13.56	13.74	13.92	101	0.9314	0.9630	0.9957
18	13.02	13.19	13.36	102	0.9086	0.9398	0.9719
19	12.51	12.67	12.83	103	0.8866	0.9172	0.9487
20	12.03	12.17	12.32	104	0.8651	0.8952	0.9263
21	11.56	11.70	11.83	105	0.8443	0.8739	0.9044
22	11.12	11.24	11.37	106	0.8242	0.8532	0.8832
23	10.69	10.81	10.93	107	0.8046	0.8331	0.8626
24	10.29	10.40	10.50	108	0.7855	0.8136	0.8426
25	9.900	10.00	10.10	109	0.7670	0.7947	0.8232
26	9.522	9.622	9.722	110	0.7491	0.7762	0.8043
27	9.161	9.261	9.361	111	0.7316	0.7583	0.7859
28	8.816	8.916	9.015	112	0.7147	0.7409	0.7681
29	8.487	8.585	8.684	113	0.6982	0.7240	0.7507
30	8.171	8.269	8.368	114	0.6822	0.7076	0.7338
31	7.869	7.967	8.065	115	0.6666	0.6916	0.7174
32	7.581	7.678	7.775	116	0.6515	0.6760	0.7014
33	7.304	7.400	7.497	117	0.6368	0.6609	0.6859
34	7.040	7.135	7.231	118	0.6224	0.6462	0.6708
35	6.786	6.881	6.975	119	0.6085	0.6319	0.6561
36	6.544	6.637	6.731	120	0.5950	0.6180	0.6418
37	6.311	6.403	6.496	121	0.5818	0.6044	0.6278
38	6.088	6.179	6.271	122	0.5690	0.5912	0.6143
39	5.875	5.965	6.056	123	0.5565	0.5784	0.6011
40	5.670	5.759	5.849	124	0.5444	0.5659	0.5882
41	5.473	5.561	5.650	125	0.5326	0.5537	0.5757
42	5.285	5.372	5.459				



## DPIM 23\*22 Package Outline Dimensions



Symbol	Dimensions in millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	4.88	5.08	0.192	0.200
A3	0.45	0.55	0.018	0.022
D	22.50	22.70	0.886	0.894
E	21.70	21.90	0.854	0.862
E2	17.90	18.10	0.705	0.713
k	15.70	15.90	0.618	0.626
L	2.45	2.55	0.096	0.100
L1	2.45	2.55	0.096	0.100
H1	1.95	2.05	0.077	0.081
H2	0.95	1.05	0.037	0.041



Attention: the direction is reversed

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Date of change	Rev #	revise content
2023/01/14	A/0	/
2023/09/19	A/1	更改封装名称为DPIM, 及封装尺寸