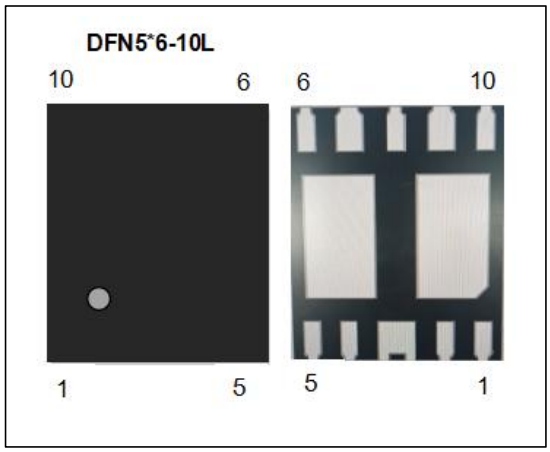
CHONGQING CLOUDCHILD TECHNOLOGY CO., LTD

DFN5*6-10L Plastic-Encapsulate MOSFETS

CCM4E20D04T N+P Channel Power MOSFET

	N-CHANNEL	P-CHANNEL
V_{DS} (V)	40	-40
$R_{DS(on)}$ (mΩ) at V_{GS} = ± 10 V	16	26
$R_{DS(on)}$ (mΩ) at V_{GS} = ± 4.5 V	25	38
I_D (A)	20	-20



DESCRIPTION

The CCM4E20D04T provides excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications .

FEATURES

- TrenchFET® Power MOSFET
- 100 % R_g and UIS Tested
- AEC Q101 qualified

APPLICATIONS

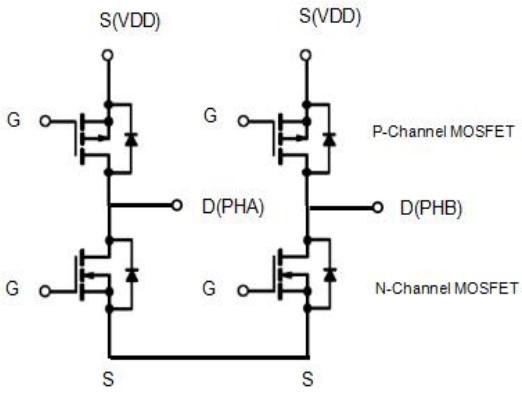
- Bridge drive
- Single phase AC motor drive
- High-frequency switching

MARKING

CCM4E20D04T =Part No.

XXXXXXX = Code.

EQUIVALENT CIRCUIT



PIN DEFINITION

Number	Pin Definition	Remark
1	GLA	Lower bridge A phase N-channel gate
2	PHA(DHA/DLA)	A phase output(Upper bridge A phase P-channel drain/Lower bridge A phase N-channel drain)
3	LS(SLA/SLB)	Lower bridge A phase and B phase N-channel source
4	PHB(DHB/DLB)	B phase output(Upper bridge B phase P-channel drain/Lower bridge B phase N-channel drain)
5	GLB	Lower bridge B phase N-channel gate
6	GHB	Upper bridge B phase P-channel gate
7	VDD(SHB)	DC Input(Upper bridge B phase P-channel source)
8	LS(SLA/SLB)	Lower bridge A phase and B phase N-channel source
9	VDD(SHA)	DC Input(Upper bridge A phase P-channel source)
10	GHA	Upper bridge A phase P-channel gate

ABSOLUTE MAXIMUM RATINGS(T_c=25℃ unless otherwise noted)

Parameter	**Symbol**	**N-CHANNEL**	**P-CHANNEL**	**Unit**
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current[1]	I_D	20	-20	A
Pulsed Drain Current[2]	I_{DM}	80	-80	
Single Pulse Avalanche Energy[3]	E_{AS}	25		mJ
Maximum Power Dissipation[2]	P_D	60		W
Thermal Resistance from Junction to Case	RθJC	2.5		°C/W
Thermal Resistance from Junction to Ambient	RθJA	62		°C/W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~ +175		℃
Soldering Temperature , for 10S(1.6mm from case)	-	260		℃

Notes:

1.Package limited.
2.Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
3. EAS condition: V_{DD}=20V,V_{GS}=10V,,ID=10A, L=0.5mH, R_g=25Ω Starting T_J =25°℃.

MOSFET ELECTRICAL CHARACTERISTICS(TC=25℃ unless otherwise specified)

Parameter	Symbol	Test Condition			Min	Typ	Max	Unit
Off characteristics								
Drain-Source Breakdown Voltage	$V_{(BR)\ DSS}$	V_{GS} = 0 V, I_D = 250 μA		N-Ch	40			V
		V_{GS} = 0 V, I_D = - 250 μA		P-Ch	-40			
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V		N-Ch	-	-	±100	nA
				P-Ch	-	-	±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	V_{DS} = 40 V	N-Ch	-	-	1	μA
		V_{GS} = 0 V	V_{DS} = -40 V	P-Ch	-	-	-1	
On characteristics								
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA		N-Ch	1.0	1.5	2.0	V
		V_{DS} = V_{GS}, I_D = - 250 μA		P-Ch	-1.1	-1.6	-2.2	V
Drain-Source On-State Resistance[1]	$R_{DS(on)}$	V_{GS} = 10 V	ID = 1A	N-Ch	-	20	25	mΩ
		V_{GS} = -10 V	ID = -1A	P-Ch	-	30	35	
		V_{GS} = 4.5 V	ID = 1 A	N-Ch	-	25	32	
		V_{GS} = -4.5 V	ID = -1 A	P-Ch	-	40	45	
Forward Transconductance[2]	g_{fs}	VDS = 10V, ID = 10 A		N-Ch	-	26	-	S
		VDS = -10 V, ID = -10 A		P-Ch	-	25	-	
Dynamic characteristics[2]								
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	N-Ch	-	775		pF
		V_{GS} = 0 V	V_{DS} = -25 V, f = 1 MHz	P-Ch	-	1490		
Output Capacitance	C_{oss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	N-Ch	-	55		
		V_{GS} = 0 V	V_{DS} = -25 V, f = 1 MHz	P-Ch	-	100		
Reverse Transfer Capacitance	C_{rss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	N-Ch	-	49		
		V_{GS} = 0 V	V_{DS} = -25 V, f = 1 MHz	P-Ch	-	110		
Gate Resistance	R_g	f = 1 MHz		N-Ch		4.6		Ω
				P-Ch		8.2		
Switching characteristics[3]								
Total Gate Charge	Q_g	V_{GS} = 10 V	V_{DD} = 20 V, I_D = 10 A	N-Ch	-	25.5	38.3	nC
		V_{GS} = -10 V	V_{DD} = -20 V, I_D = -10 A	P-Ch	-	30.2	45	
Gate-Source Charge	Q_{gs}	V_{GS} = 10 V	V_{DD} = 20 V, I_D = 10 A	N-Ch	-	4.4	-	
		V_{GS} = -10 V	V_{DSD} = -20 V, I_D = -10 A	P-Ch	-	4.1	-	
Gate-Drain Charge	Q_{gd}	V_{GS} = 10 V	V_{DS} = 20 V, I_D = 10 A	N-Ch	-	4.3	-	
		V_{GS} = -10 V	V_{DS} = -20 V, I_D = -10 A	P-Ch	-	7.4	-	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20 V,I_D = 10 A,V_{GS} = 10 V, R_g = 1 Ω		N-Ch	-	8	12	ns
		V_{DD} = -20 V, I_D =-10 A,V_{GS} = -10 V, R_g = 1 Ω		P-Ch	-	7	11	
Rise Time	t_r	V_{DD} = 20 V, I_D = 10 A,V_{GS} = 10 V, R_g = 1 Ω		N-Ch	-	12	18	
		V_{DD} = -20 V, I_D =-10 A,V_{GS} = -10 V, R_g = 1 Ω		P-Ch	-	9	13	
Turn-Off Delay Time	$t_{d(off)}$	V_{DD} = 20 V, I_D = 10 A, V_{GS} = 10 V, R_g = 1 Ω		N-Ch	-	22	33	
		V_{DD} = -20 V, I_D = -10 A,V_{GS} = -10 V, R_g = 1 Ω		P-Ch	-	43	64	
Fall Time	t_f	V_{DD} = 20 V, I_D =10 A, V_{GS} = 10 V, R_g = 1 Ω		N-Ch	-	10	16	
		V_{DD} = -20 V, I_D = -10 A,V_{GS} = -10 V, R_g = 1 Ω		P-Ch	-	19	28	
Drain-Source Diode Characteristics								
Forward Voltage[2]	V_{SD}	I_S = 6.5 A		N-Ch	-	0.79	1.2	V
		I_S = -3.4 A		P-Ch	-	-0.78	-1.2	
Continuous drain-source diode forward Current[4]	Is			N-Ch			20	A
				P-Ch			-20	
Pulsed Current[1]	I_{SM}			N-Ch	-	-	80	A
				P-Ch	-	-	-80	
Reverse recovery time	Trr	IF=20A，dI/dt=100A/us		N-Ch		10		ns
		IF=-20A，dI/dt=100A/us		P-Ch		18		
Reverse recovery charge	Qrr	IF=20A，dI/dt=100A/us		N-Ch		14		nC
		IF=-20A，dI/dt=100A/us		P-Ch		12		

Notes:

1.Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

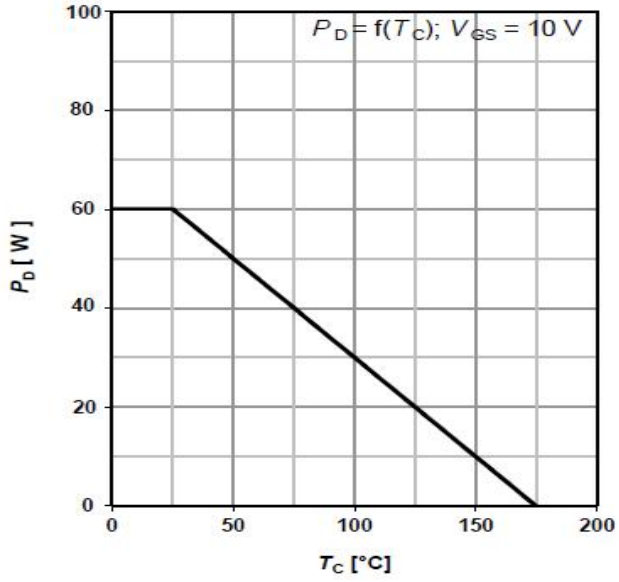
2.Guaranteed by design, not subject to production testing.

3.Independent of operating temperature.

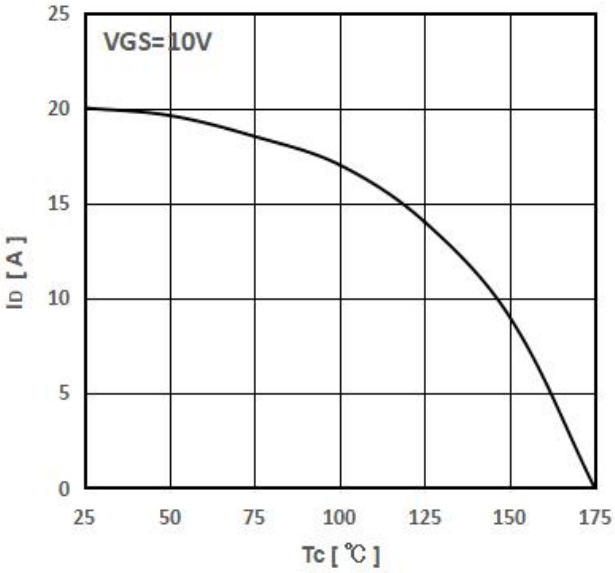
4.T_C=25℃ Limited only by maximum temperature allowed.

N-Channel Typical Characteristics

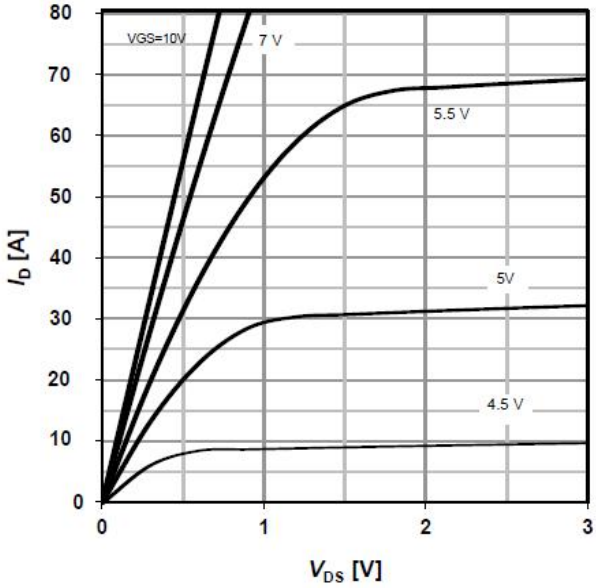
PD -- Tc



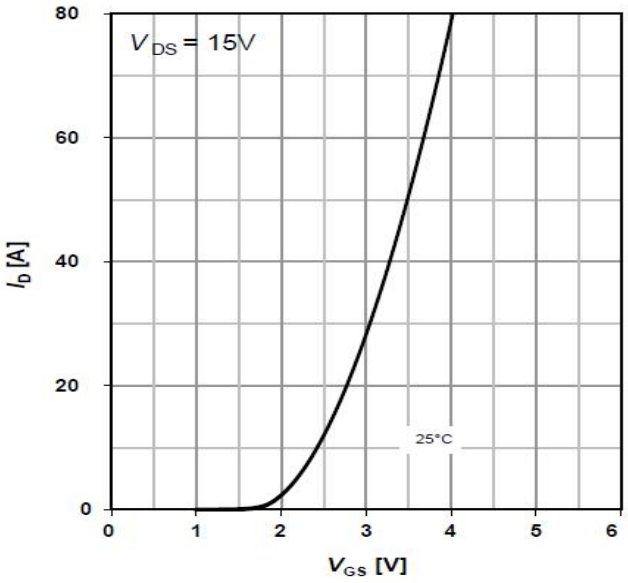
ID -- Tc



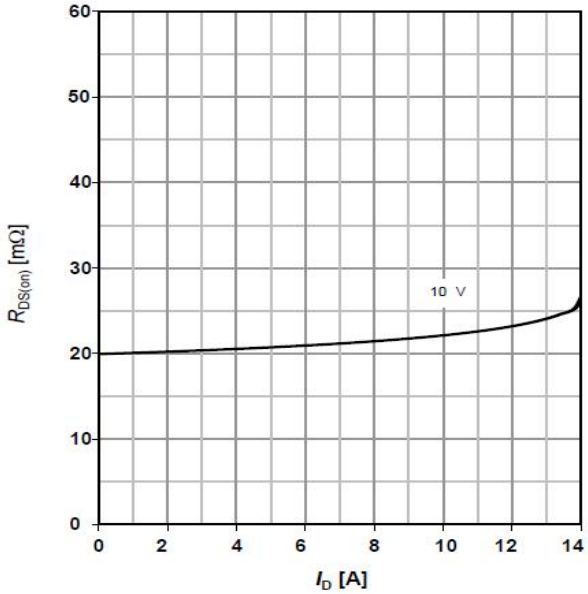
ID -- VDS



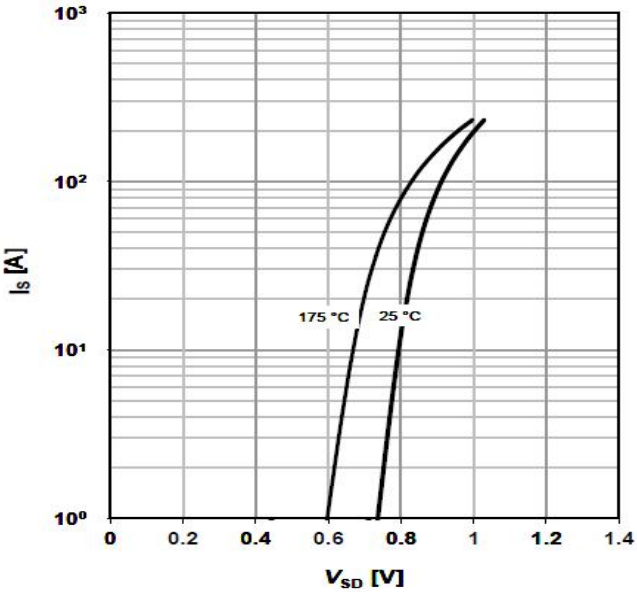
ID -- VGS



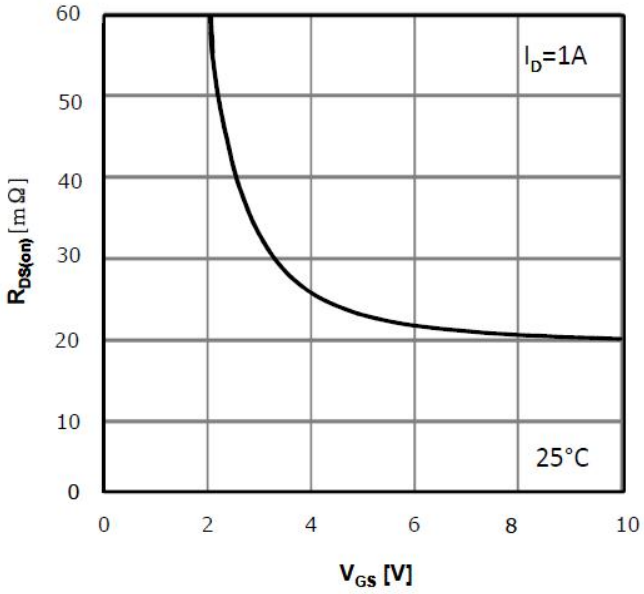
RDS(on) -- ID



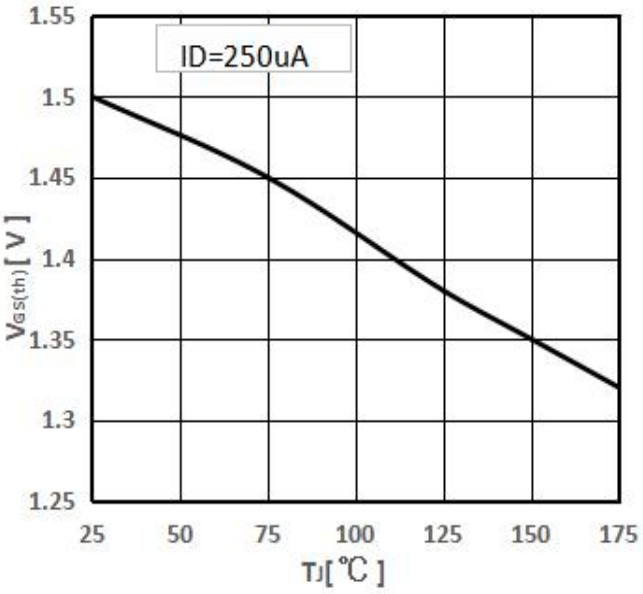
Is -- VSD



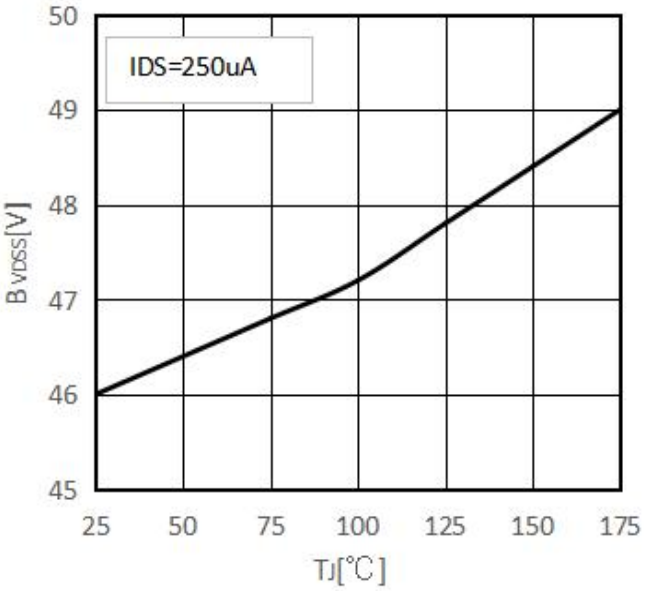
RDS(on) -- VGS



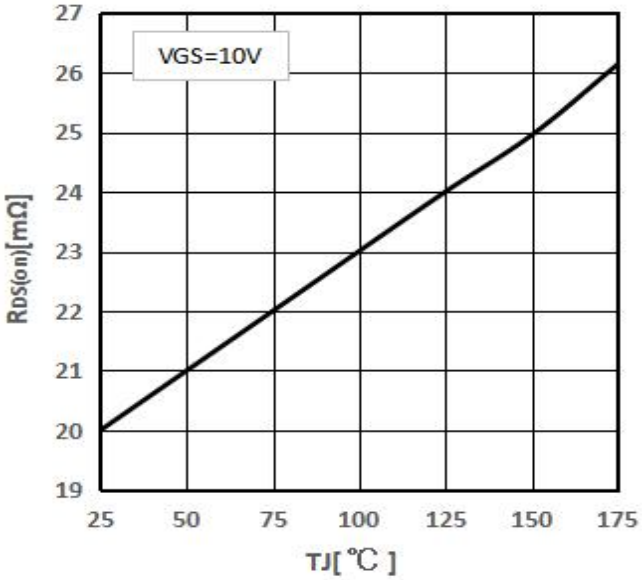
Threshold Voltage



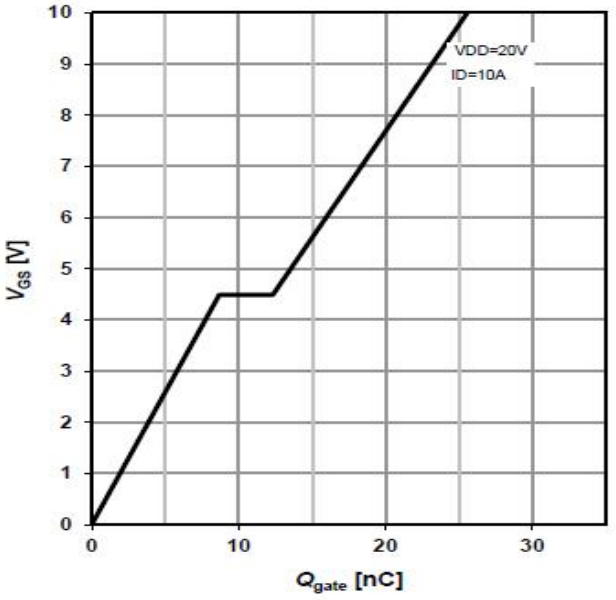
Drain-source breakdown voltage



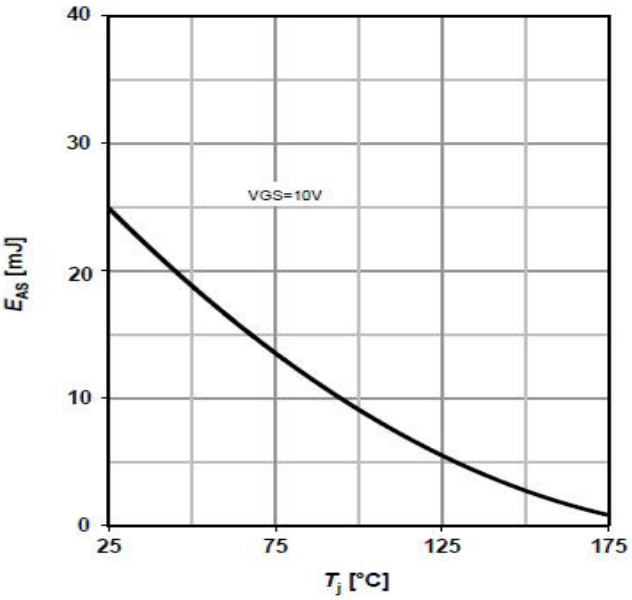
RDS（on） -- Tj



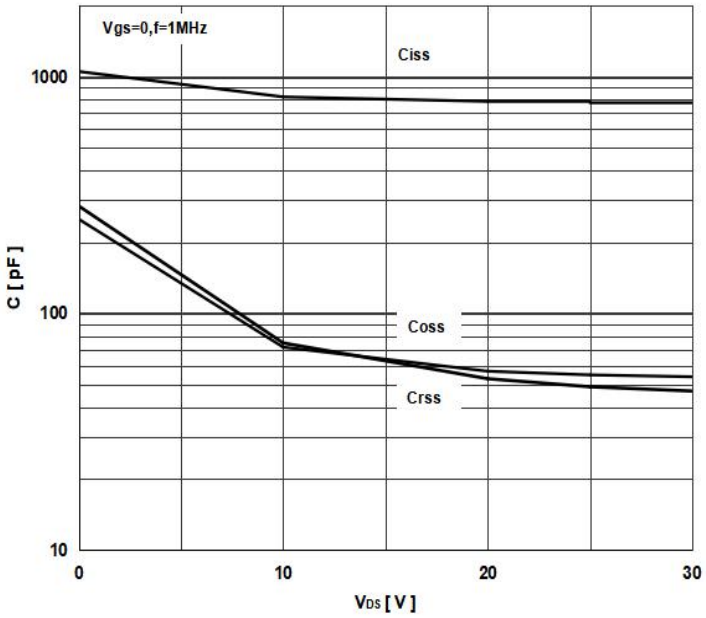
Typ.gate charge



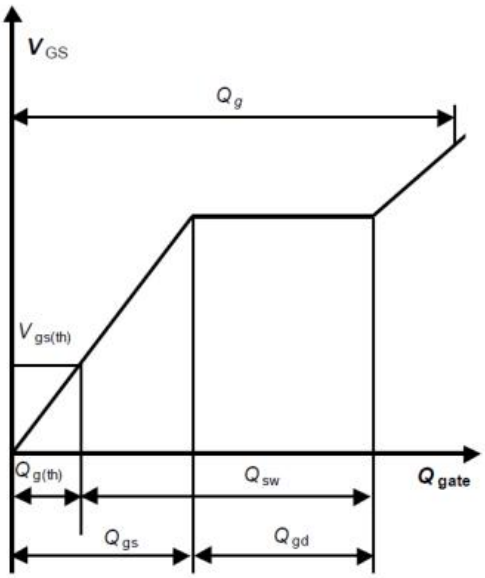
Avalanche energy



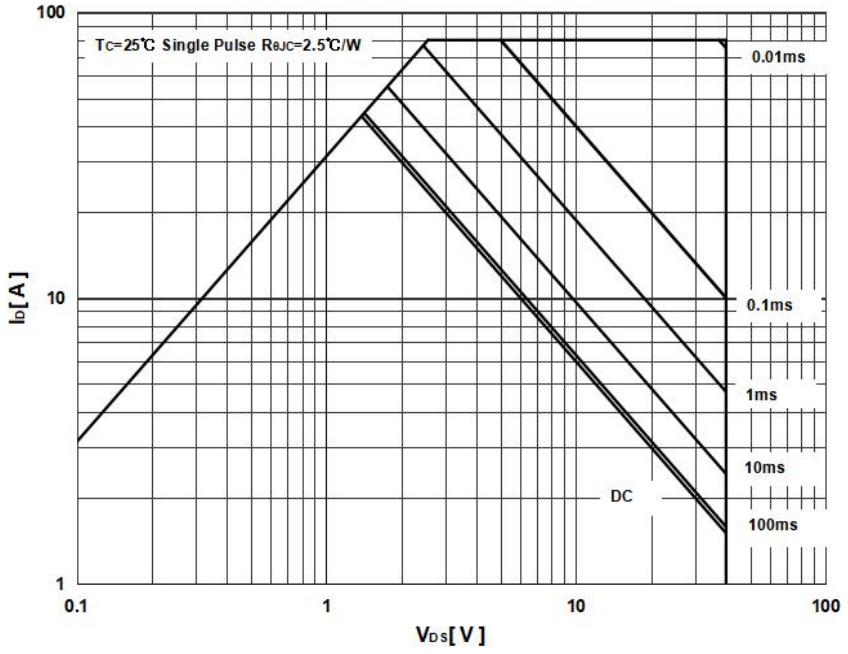
Typ.capacitance



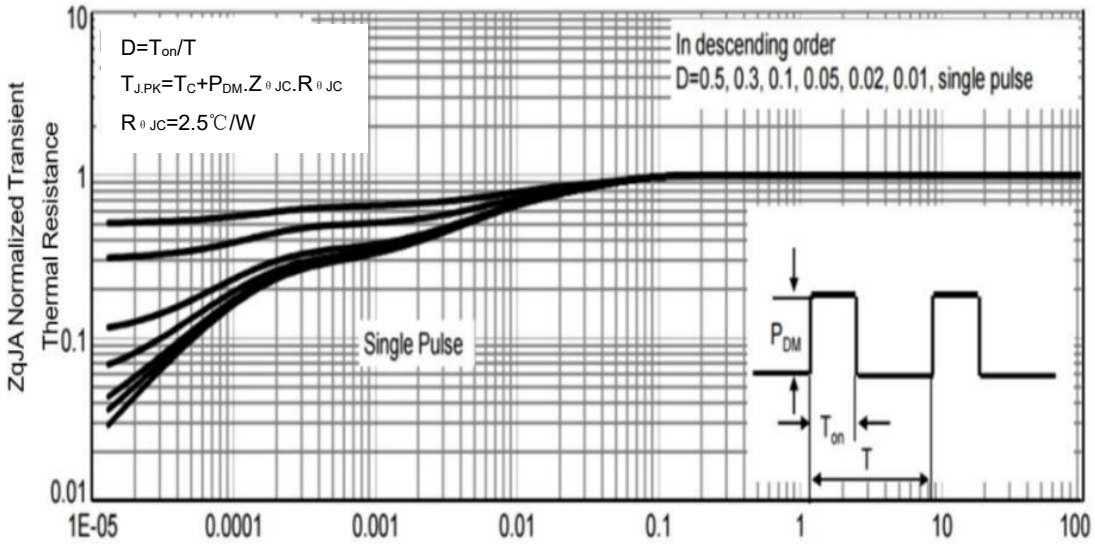
Gate charge waveforms



Maximum Forward Biased Safe Operating Area

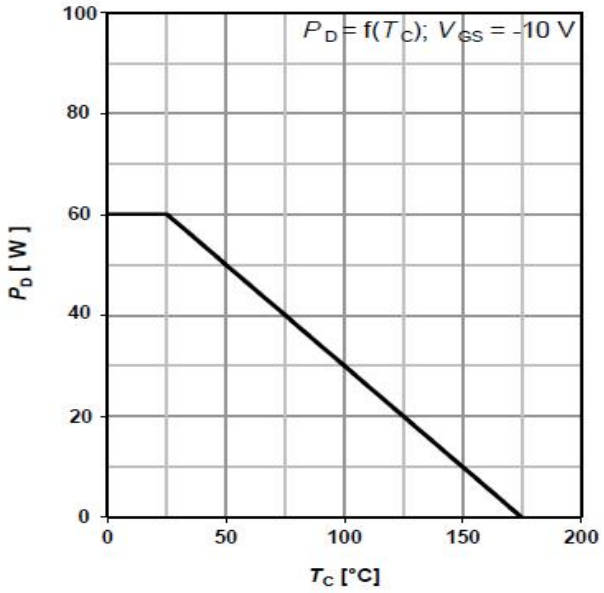


Normalized Thermal Transient Impedance

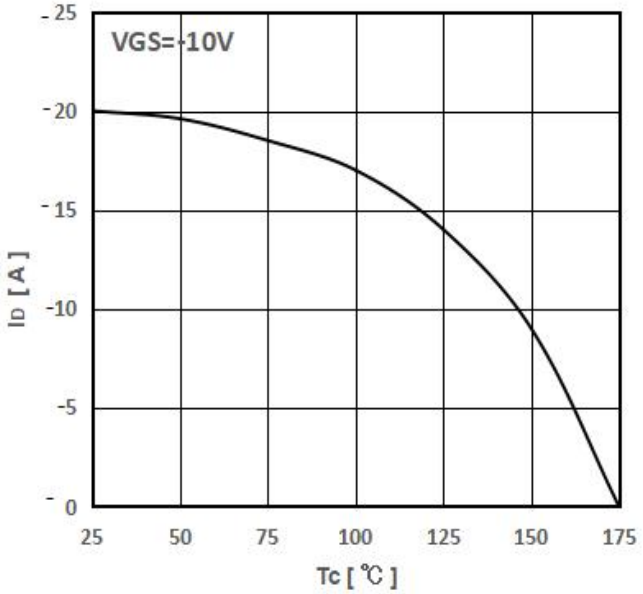


P-Channel Typical Characteristics

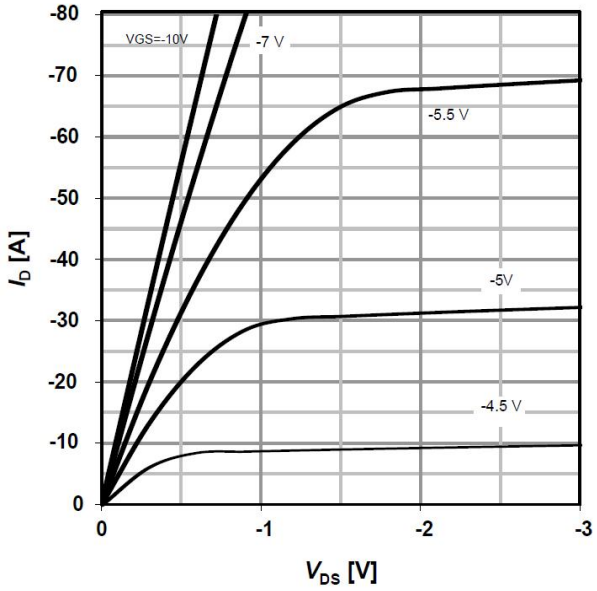
PD -- Tc



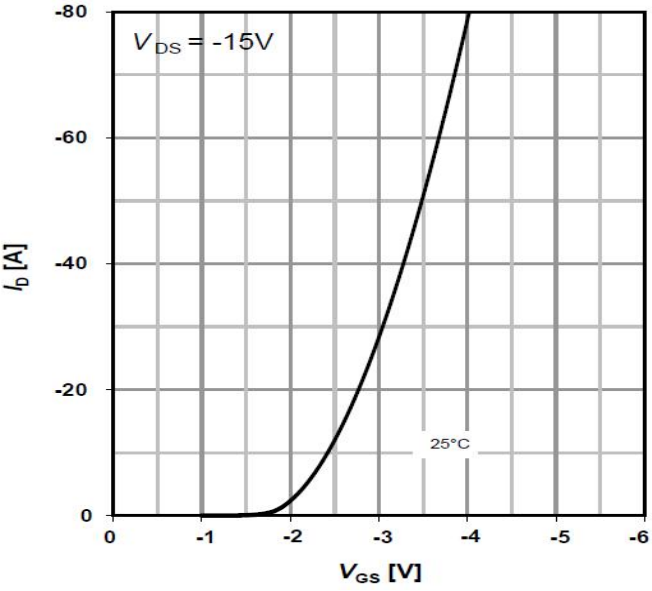
ID -- Tc



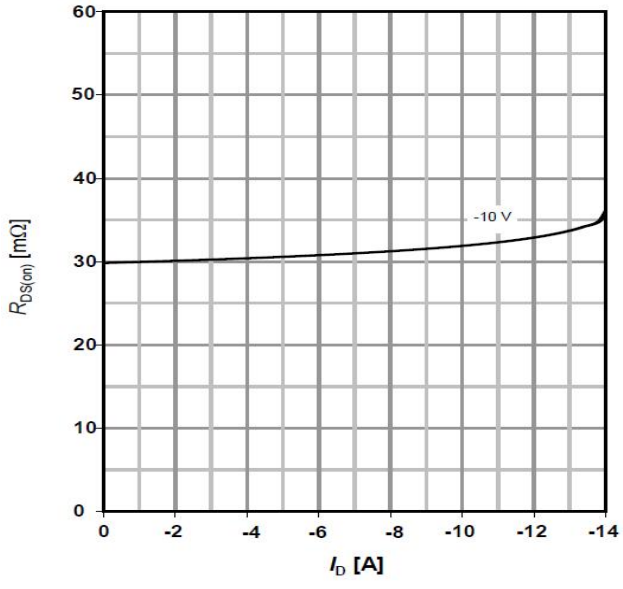
ID -- VDS



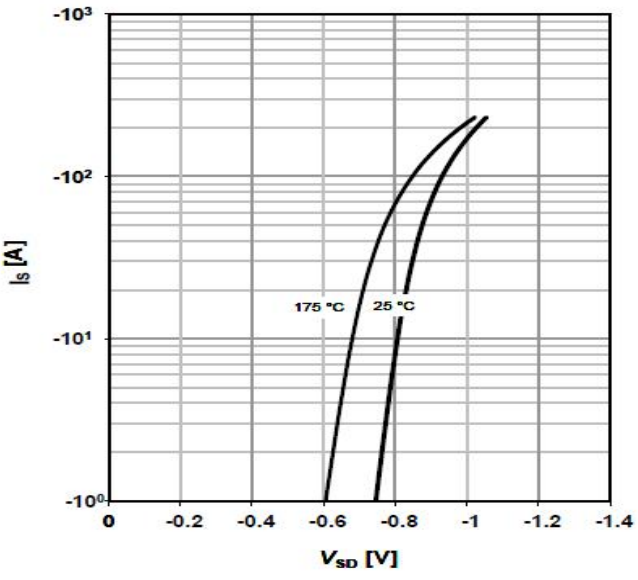
ID -- VGS



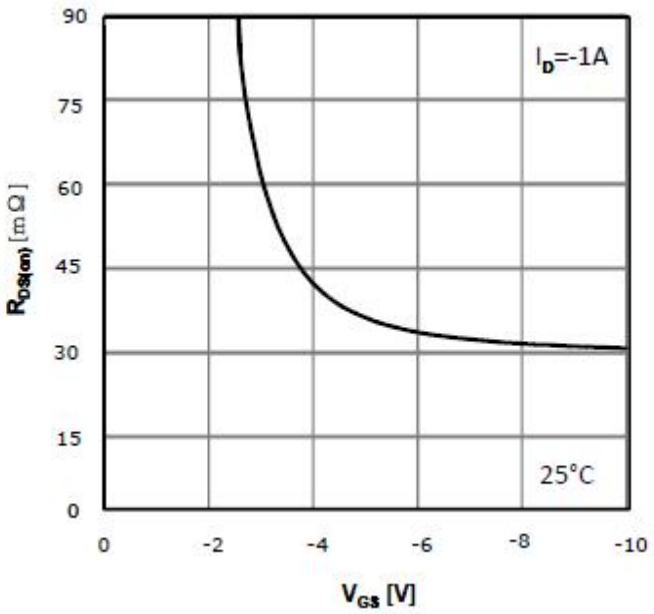
RDS(on) -- ID



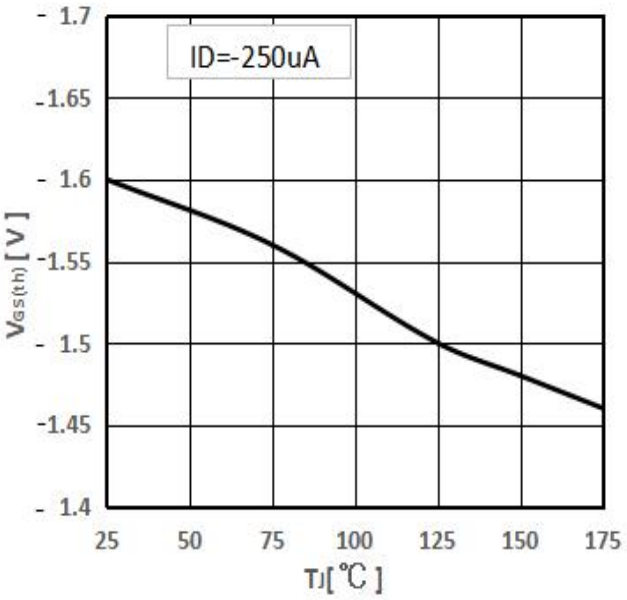
Is -- VSD



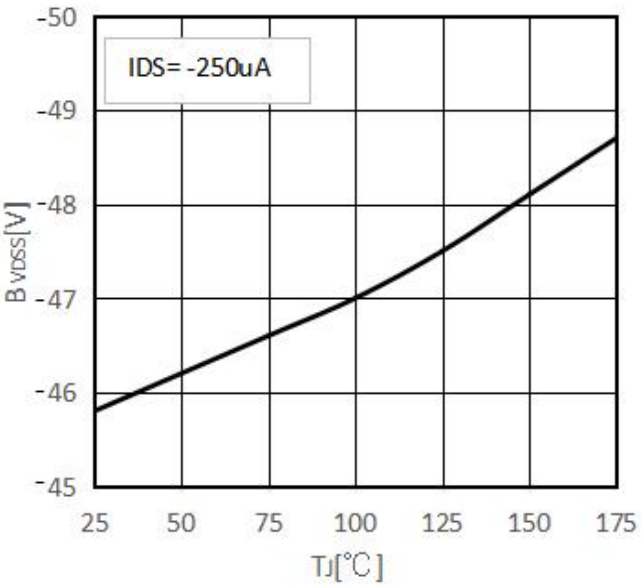
RDS(on) -- VGS



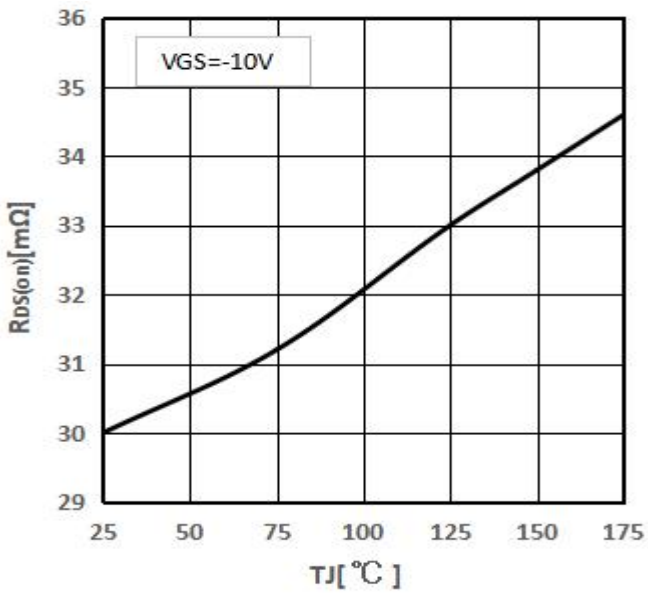
Threshold Voltage



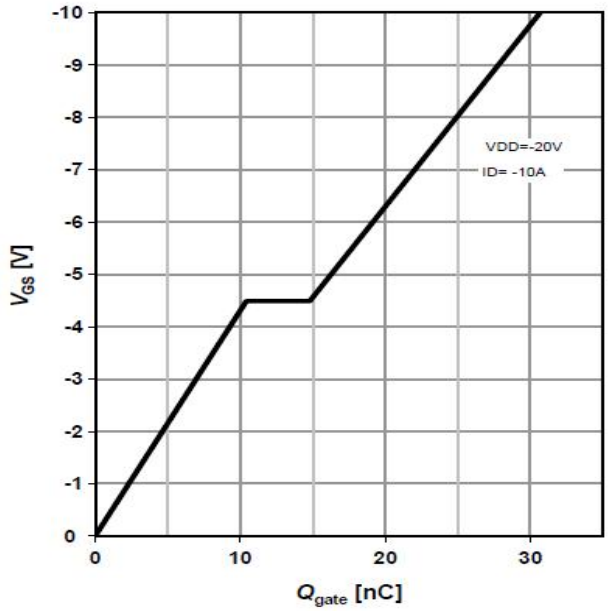
Drain-source breakdown voltage



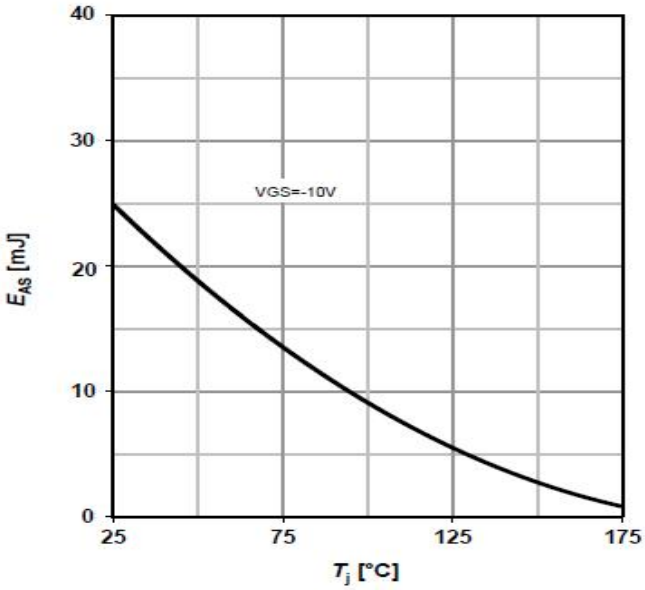
RDS（on） -- Tj



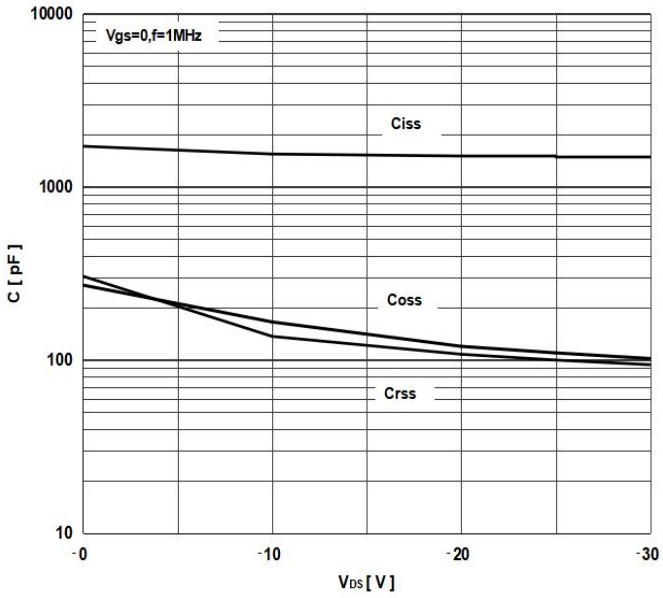
Typ.gate charge



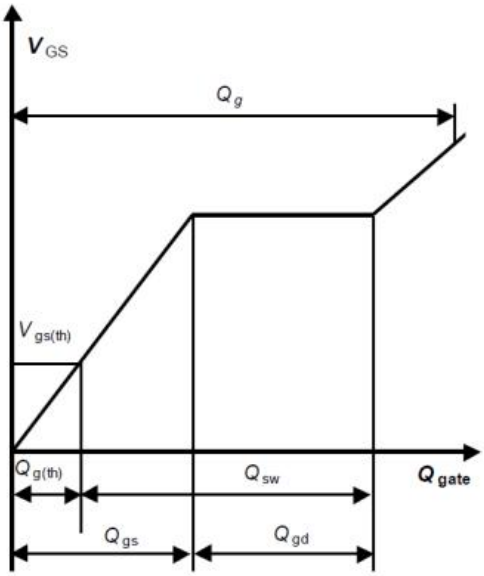
Avalanche energy



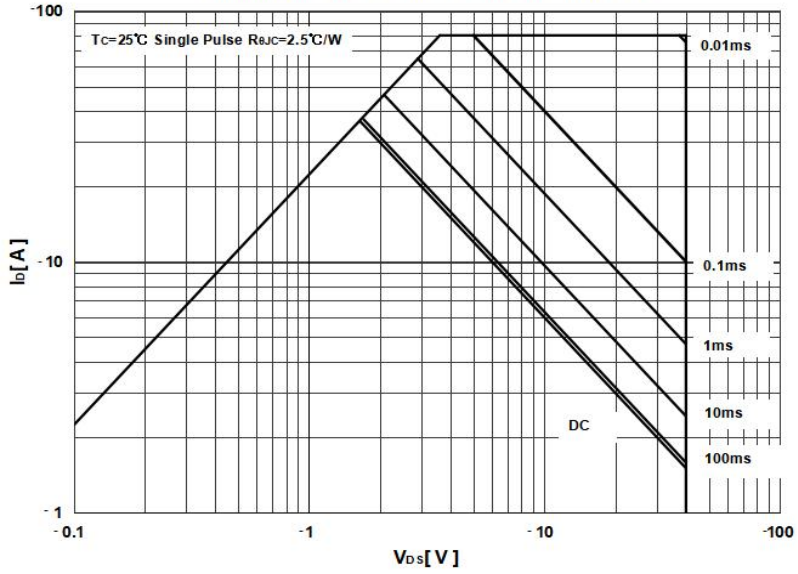
Typ.capacitance



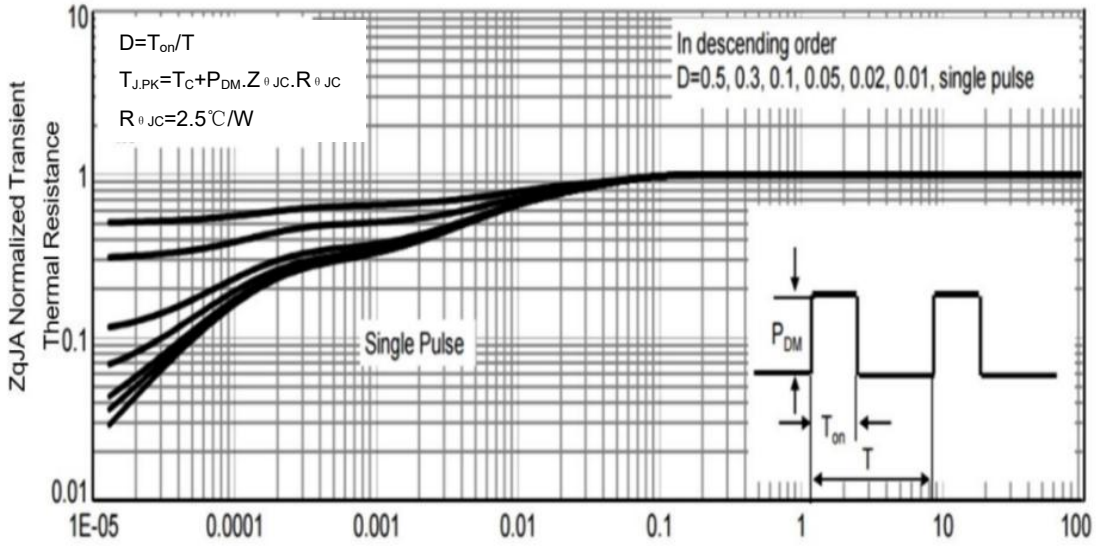
Gate charge waveforms



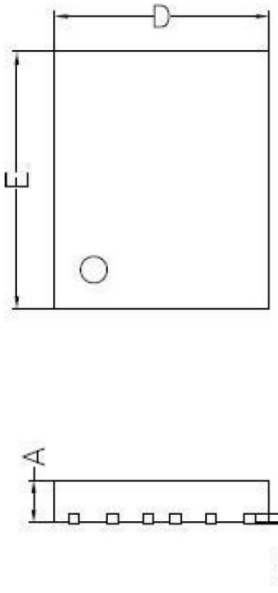
Maximum Forward Biased Safe Operating Area

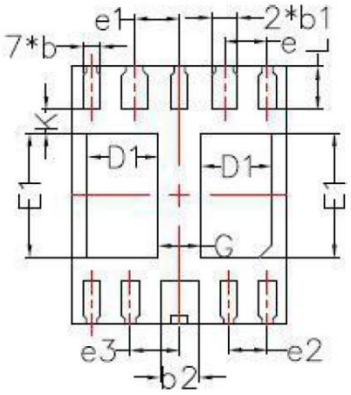


Normalized Thermal Transient Impedance



DFN5*6-10L Package Outline Dimensions



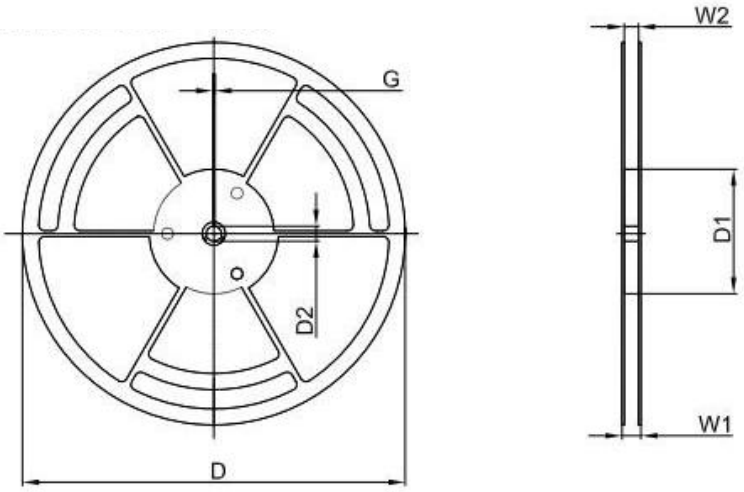


Unit：mm

Package Dimensions			
Symbols	Min	Nom	Max
A	0.95	1.00	1.05
A1		0.203REF	
A2	0.00	0.02	0.05
D	4.90	5.00	5.10
E	5.90	6.00	6.10
D1	1.60	1.65	1.70
E1	2.85	2.90	2.95
L	0.95	1.00	1.05
b	0.35	0.40	0.45
b1	0.55	0.60	0.65
b2	0.85	0.90	0.95
K	0.50	0.55	0.60
G	0.95	1.00	1.05
e		1.00BSC	
e1		1.05BSC	
e2		0.90BSC	
e3		1.15BSC	

DFN5*6-10L Tape and Reel

DFN5*6-10L Reel



Dimensions are in millimeter						
Reel Option	D	D1	D2	G	W1	W2
13"Dia	Ø330.00	100.00	13.00	1.90	17.60	12.40

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)
5,000 pcs	13 inch	5,000 pcs	340×336×29	50,000 pcs	353×346×365

Date of change	Rev #	revise content
2022/12/12	A/0	/