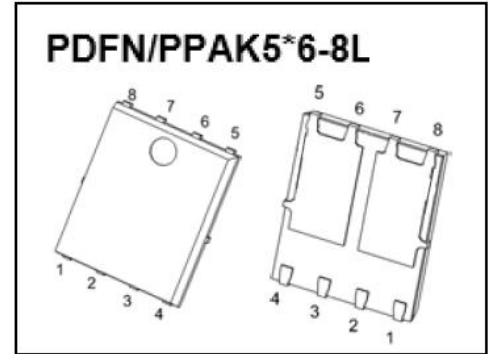




PDFN/PPAK5×6-8L Plastic-Encapsulate MOSFETS

CCM2E30D04T N+P Channel Power MOSFET

	N-CHANNEL	P-CHANNEL
V_{DS} (V)	40	-40
$R_{DS(on)}$ (mΩ) at $V_{GS} = \pm 10$ V	8	27
$R_{DS(on)}$ (mΩ) at $V_{GS} = \pm 4.5$ V	10	34
I_D (A)	30	-30



DESCRIPTION

The CCM2E30D04T provides excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications .

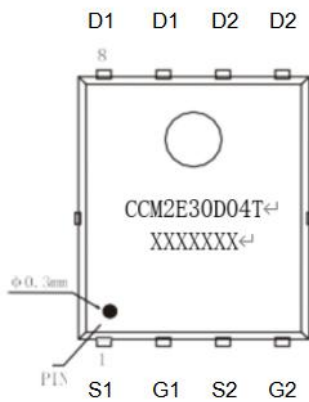
FEATURES

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

APPLICATIONS

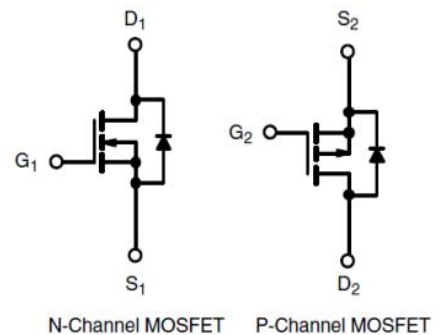
- Solenoid valve drive
- High-frequency switching

MARKING



CCM2E30D04T =Part No.
 XXXXXXXX = Code.

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS($T_c=25^{\circ}\text{C}$ 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	30	-30	A
Pulsed Drain Current ²	I_{DM}	120	-120	
Single Pulse Avalanche Energy ³	E_{AS}	46		mJ
Maximum Power Dissipation ²	P_D	48		W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	3.1		$^{\circ}\text{C}/\text{W}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~ +175		$^{\circ}\text{C}$
Soldering Temperature , for 10S(1.6mm from case)	-	260		$^{\circ}\text{C}$

Notes:

- 1.Package limited.
- 2.Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2 \%$.
3. EAS condition: $V_{DD}=20\text{V}, V_{GS}=10\text{V}, I_D=13.5\text{A}, L=0.5\text{mH}, R_g=25\Omega$ Starting $T_J = 25^{\circ}\text{C}$.

MOSFET ELECTRICAL CHARACTERISTICS(TC=25°C unless otherwise specified)

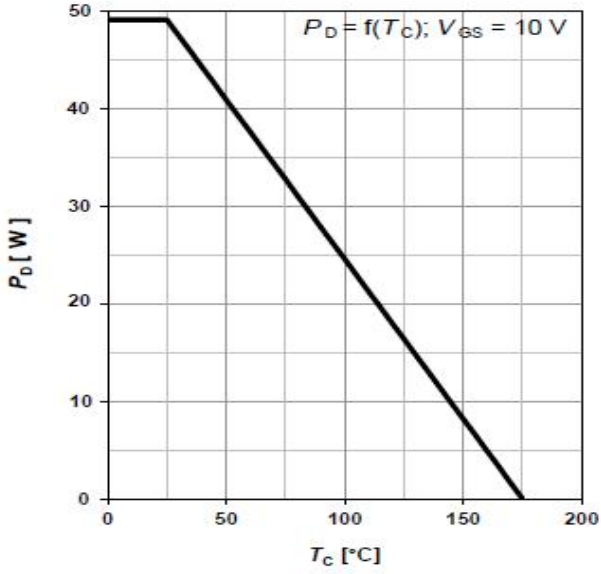
Parameter	Symbol	Test Condition		Min	Typ	Max	Unit	
Off characteristics								
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$		N-Ch	40		V	
		$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$		P-Ch	-40			
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$		N-Ch	-	± 100	nA	
				P-Ch	-	± 100		
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$	N-Ch	-	1	μA	
		$V_{GS} = 0\text{ V}$	$V_{DS} = -40\text{ V}$	P-Ch	-	-1		
On characteristics								
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$		N-Ch	1.5	1.7	3.0	V
		$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$		P-Ch	-1.1	-1.5	-2.2	V
Drain-Source On-State Resistance ¹	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 10\text{ A}$	N-Ch	-	8	11.5	m Ω
		$V_{GS} = -10\text{ V}$	$I_D = -10\text{ A}$	P-Ch	-	27	33	
		$V_{GS} = 4.5\text{ V}$	$I_D = 10\text{ A}$	N-Ch	-	10	13.5	
		$V_{GS} = -4.5\text{ V}$	$I_D = -10\text{ A}$	P-Ch	-	34	42	
Forward Transconductance ²	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 10\text{ A}$		N-Ch	-	28	-	S
		$V_{DS} = -10\text{ V}, I_D = -10\text{ A}$		P-Ch	-	25	-	
Dynamic characteristics²								
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	N-Ch	-	2880		pF
		$V_{GS} = 0\text{ V}$	$V_{DS} = -25\text{ V}, f = 1\text{ MHz}$	P-Ch	-	1440		
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	N-Ch	-	174		pF
		$V_{GS} = 0\text{ V}$	$V_{DS} = -25\text{ V}, f = 1\text{ MHz}$	P-Ch	-	99		
Reverse Transfer Capacitance	C_{rss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	N-Ch	-	136		pF
		$V_{GS} = 0\text{ V}$	$V_{DS} = -25\text{ V}, f = 1\text{ MHz}$	P-Ch	-	109		
Gate Resistance	R_g	$f = 1\text{ MHz}$		N-Ch		3		Ω
				P-Ch		8.3		
Switching characteristics³								
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$V_{DD} = 20\text{ V}, I_D = 10\text{ A}$	N-Ch	-	26.5		nC
		$V_{GS} = -10\text{ V}$	$V_{DD} = -20\text{ V}, I_D = -10\text{ A}$	P-Ch	-	32		
Gate-Source Charge	Q_{gs}	$V_{GS} = 10\text{ V}$	$V_{DD} = 20\text{ V}, I_D = 10\text{ A}$	N-Ch	-	4.5	-	nC
		$V_{GS} = -10\text{ V}$	$V_{DSD} = -20\text{ V}, I_D = -10\text{ A}$	P-Ch	-	4.8	-	
Gate-Drain Charge	Q_{gd}	$V_{GS} = 10\text{ V}$	$V_{DS} = 20\text{ V}, I_D = 10\text{ A}$	N-Ch	-	5.2	-	nC
		$V_{GS} = -10\text{ V}$	$V_{DS} = -20\text{ V}, I_D = -10\text{ A}$	P-Ch	-	8.8	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}, I_D = 10\text{ A}, V_{GS} = 10\text{ V}, R_g = 1\ \Omega$		N-Ch	-	12		ns
		$V_{DD} = -20\text{ V}, I_D = -10\text{ A}, V_{GS} = -10\text{ V}, R_g = 1\ \Omega$		P-Ch	-	11		
Rise Time	t_r	$V_{DD} = 20\text{ V}, I_D = 10\text{ A}, V_{GS} = 10\text{ V}, R_g = 1\ \Omega$		N-Ch	-	18		ns
		$V_{DD} = -20\text{ V}, I_D = -10\text{ A}, V_{GS} = -10\text{ V}, R_g = 1\ \Omega$		P-Ch	-	13		
Turn-Off Delay Time	$t_{d(off)}$	$V_{DD} = 20\text{ V}, I_D = 10\text{ A}, V_{GS} = 10\text{ V}, R_g = 1\ \Omega$		N-Ch	-	33		ns
		$V_{DD} = -20\text{ V}, I_D = -10\text{ A}, V_{GS} = -10\text{ V}, R_g = 1\ \Omega$		P-Ch	-	64		
Fall Time	t_f	$V_{DD} = 20\text{ V}, I_D = 10\text{ A}, V_{GS} = 10\text{ V}, R_g = 1\ \Omega$		N-Ch	-	16		ns
		$V_{DD} = -20\text{ V}, I_D = -10\text{ A}, V_{GS} = -10\text{ V}, R_g = 1\ \Omega$		P-Ch	-	28		
Drain-Source Diode Characteristics								
Forward Voltage ²	V_{SD}	$I_S = 6.5\text{ A}$		N-Ch	-	0.79	1.2	V
		$I_S = -3.4\text{ A}$		P-Ch	-	-0.78	-1.2	
Continuous drain-source diode forward Current ⁴	I_S			N-Ch		30		A
				P-Ch		-30		
Pulsed Current ¹	I_{SM}			N-Ch	-	-	120	A
				P-Ch	-	-	-120	
Reverse recovery time	T_{rr}	$I_F = 30\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		N-Ch		10		ns
		$I_F = -30\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		P-Ch		18		
Reverse recovery charge	Q_{rr}	$I_F = 30\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		N-Ch		14		nC
		$I_F = -30\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		P-Ch		12		

Notes:

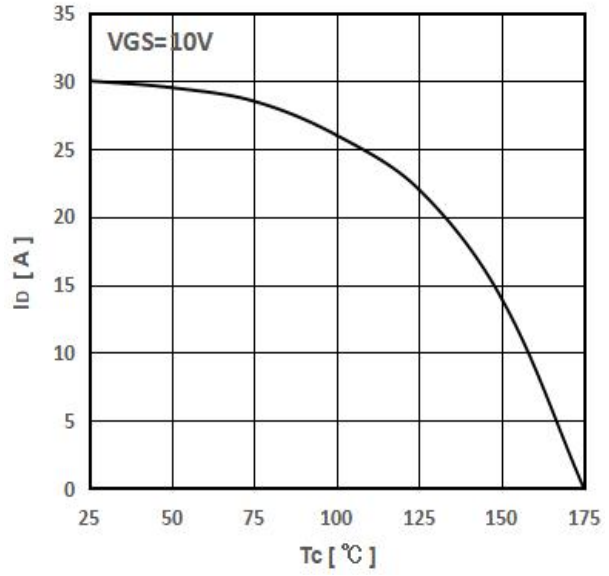
1. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
2. Guaranteed by design, not subject to production testing.
3. Independent of operating temperature.
4. TC=25°C Limited only by maximum temperature allowed.

N-Channel Typical Characteristics

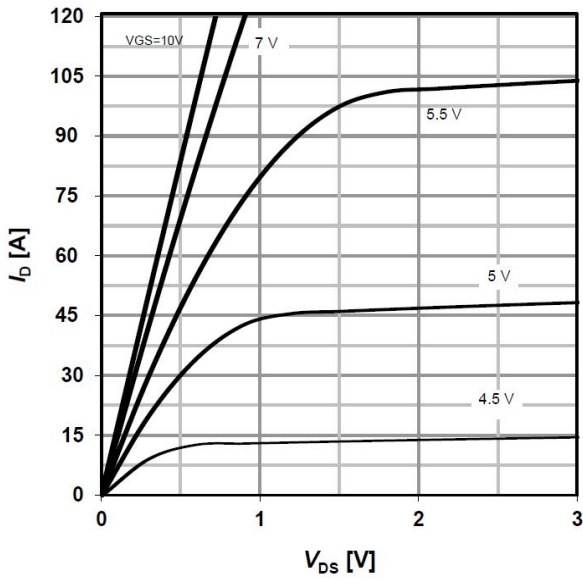
PD -- Tc



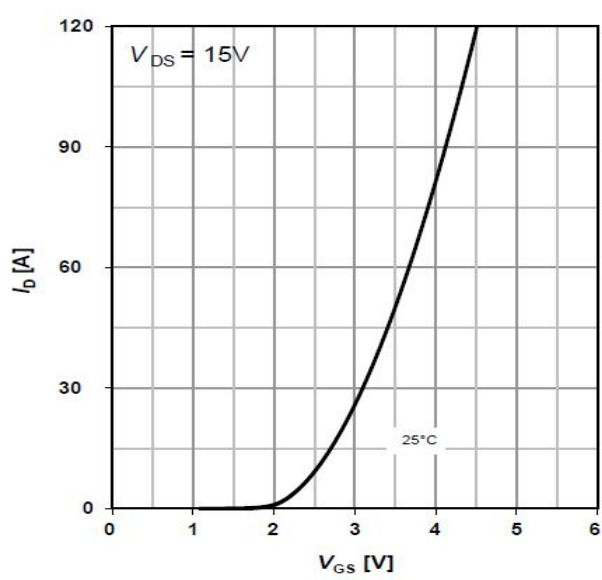
ID -- Tc



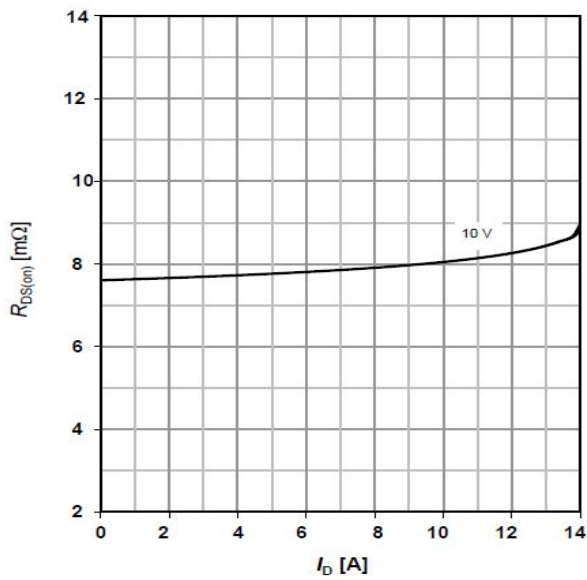
ID -- VDS



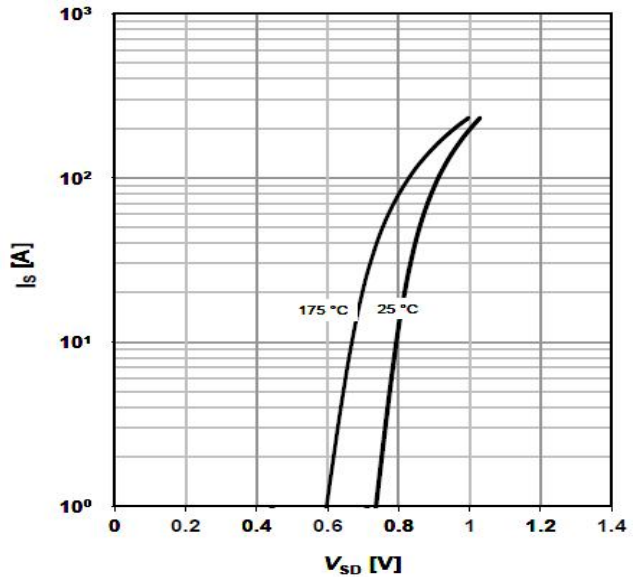
ID -- VGS



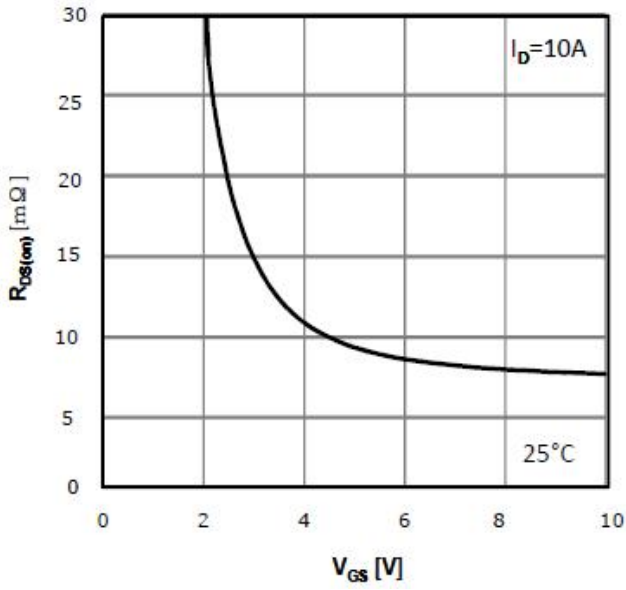
RDS(on) -- ID



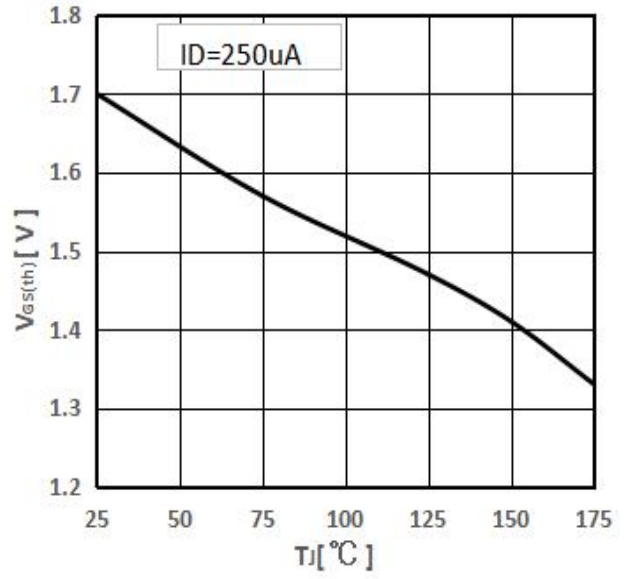
IS -- VSD



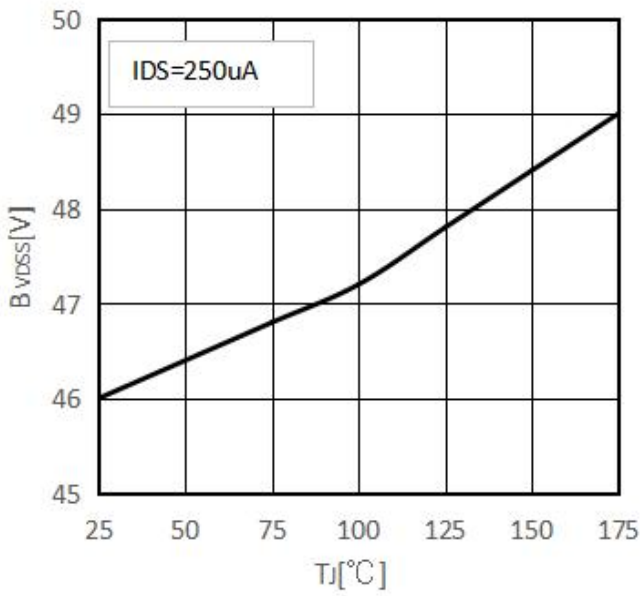
RDS(on) -- VGS



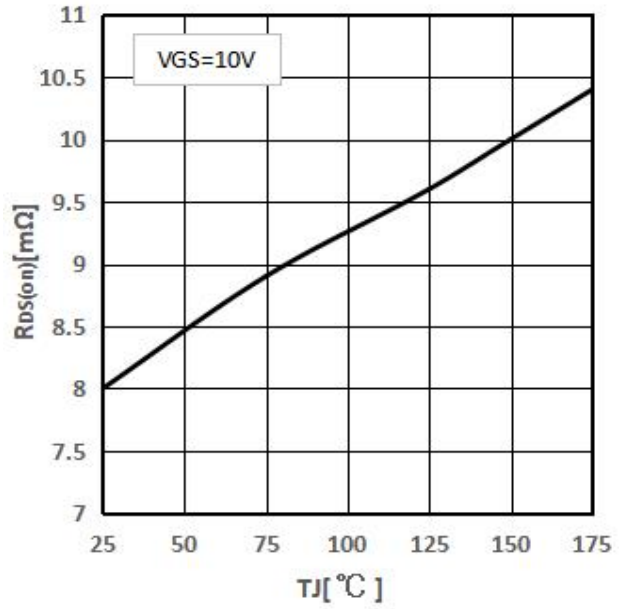
Threshold Voltage



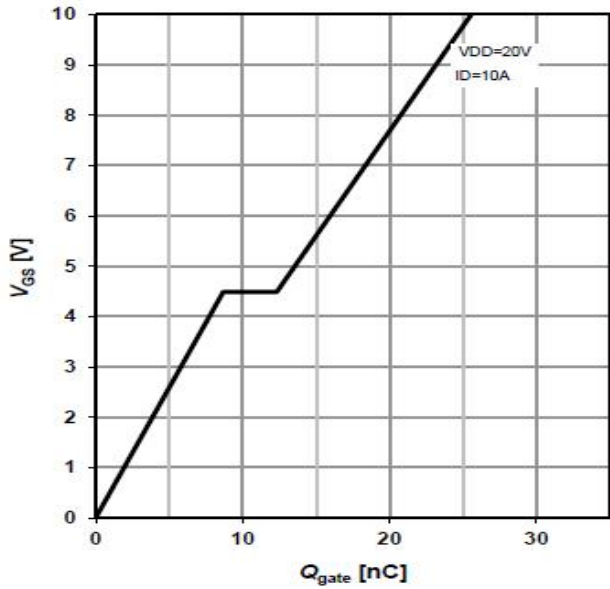
Drain-source breakdown voltage



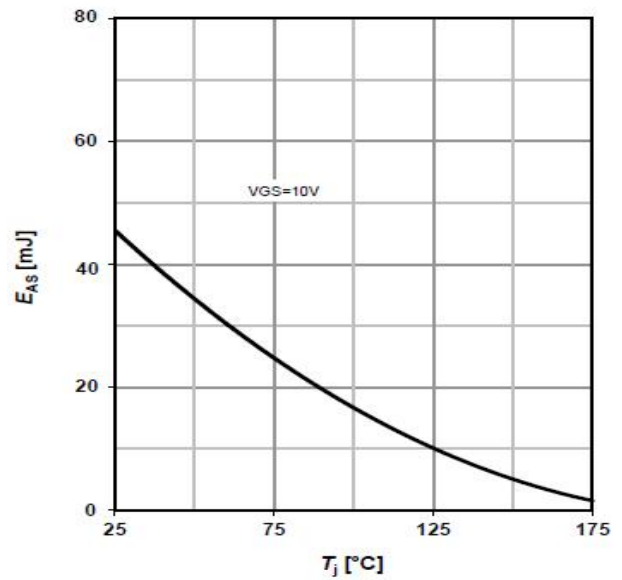
RDS (on) -- TJ



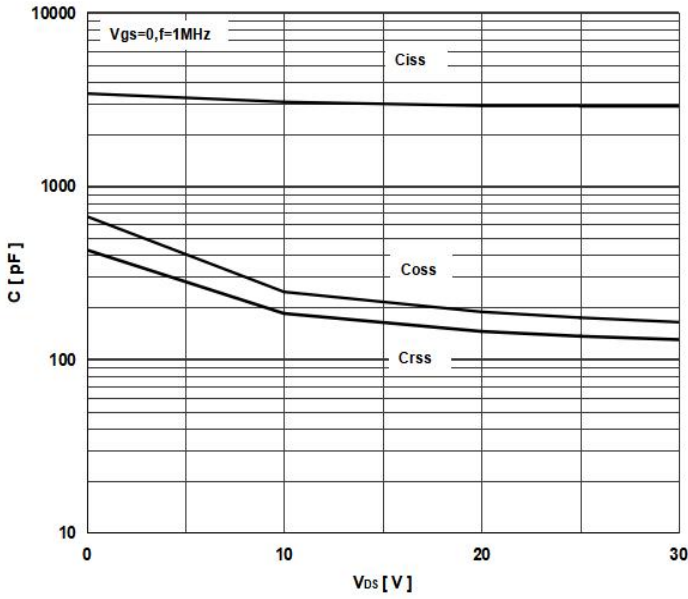
Typ.gate charge



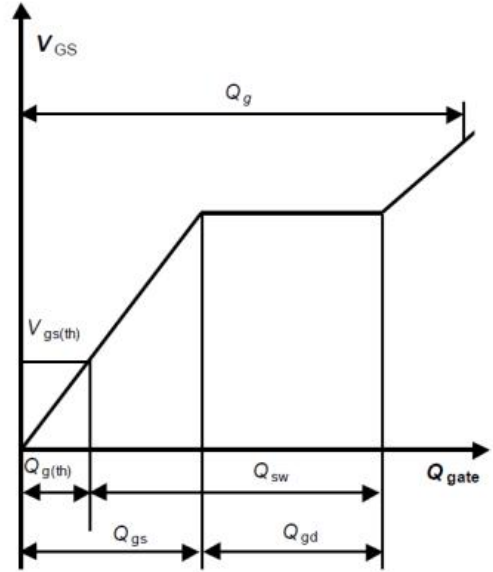
Avalanche energy



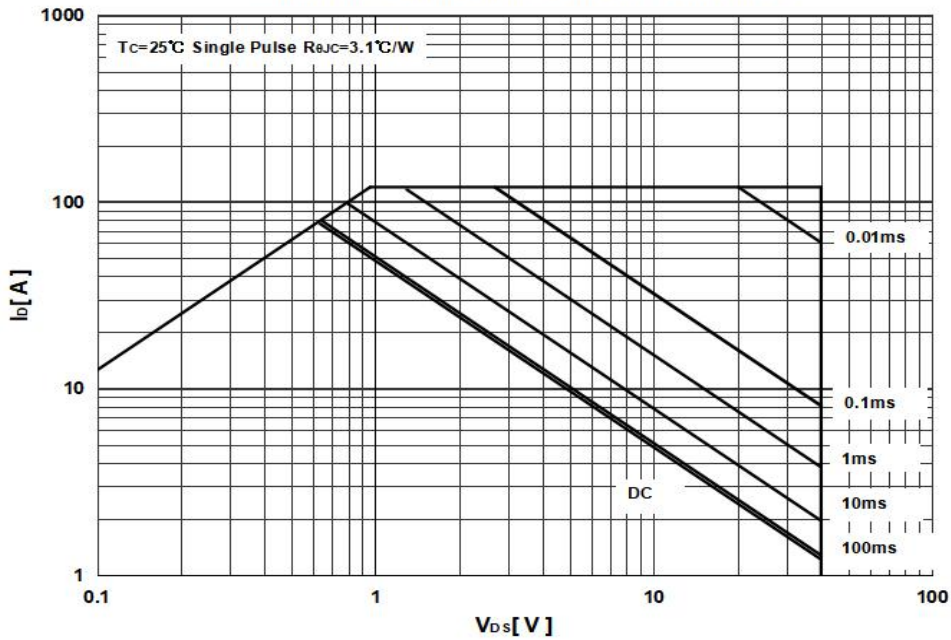
Typ. capacitance



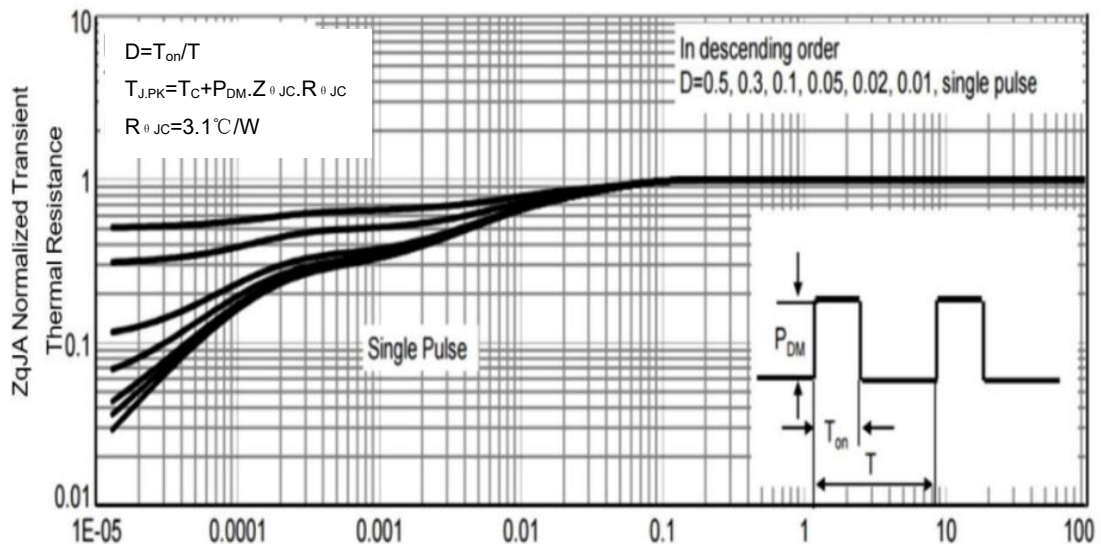
Gate charge waveforms



Maximum Forward Biased Safe Operating Area

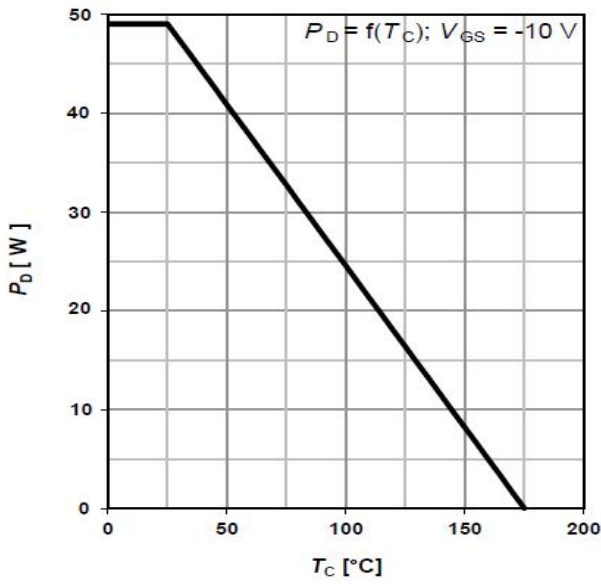


Normalized Thermal Transient Impedance

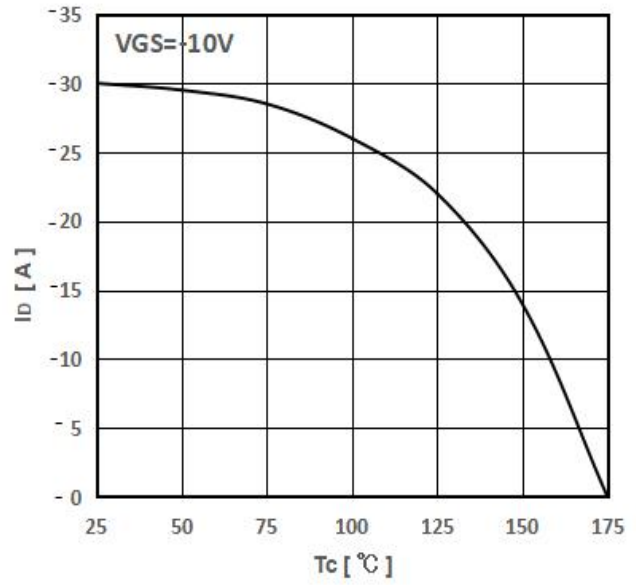


P-Channel Typical Characteristics

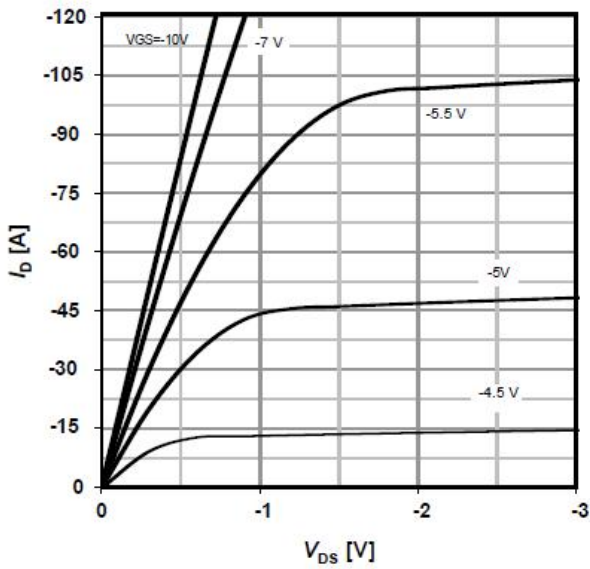
PD -- Tc



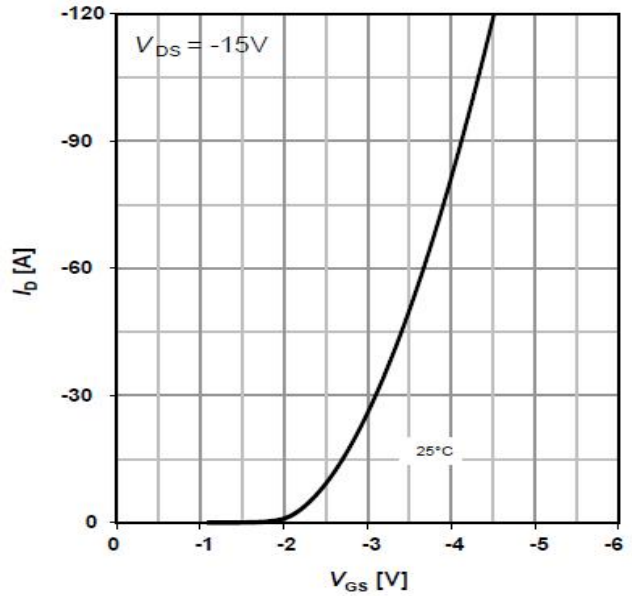
ID -- Tc



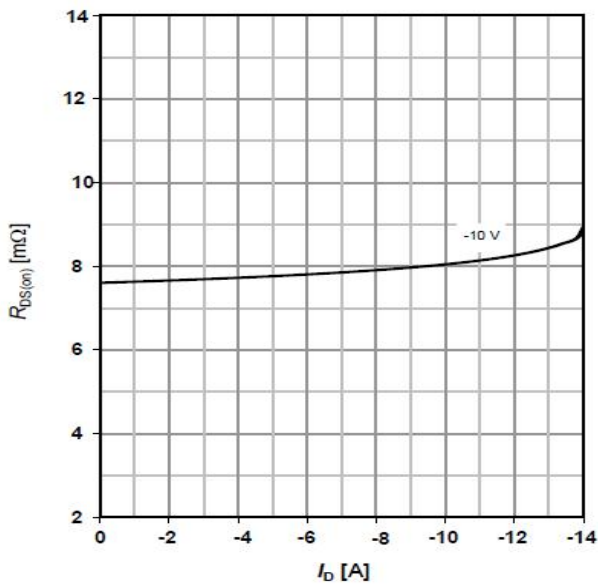
ID -- VDS



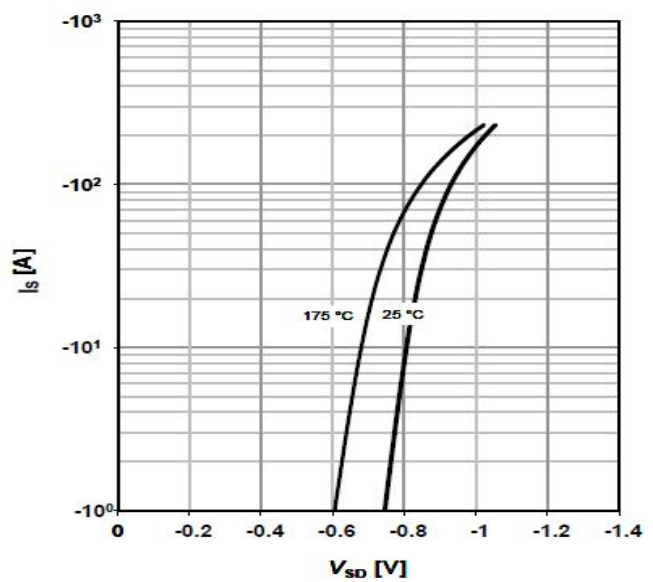
ID -- VGS



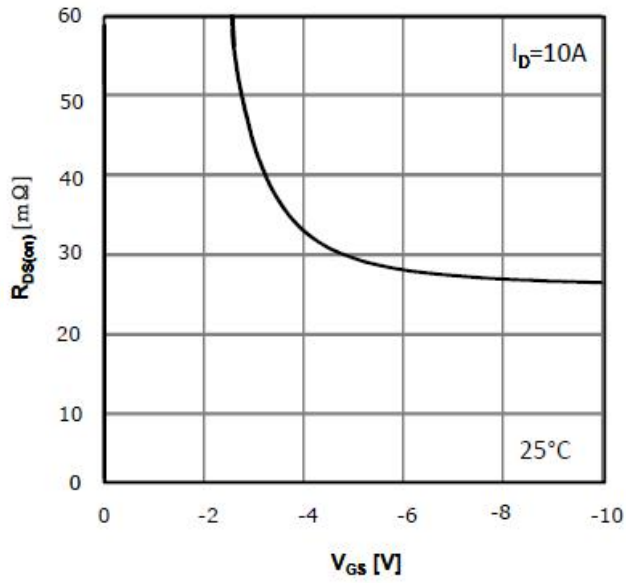
RDS(on) -- ID



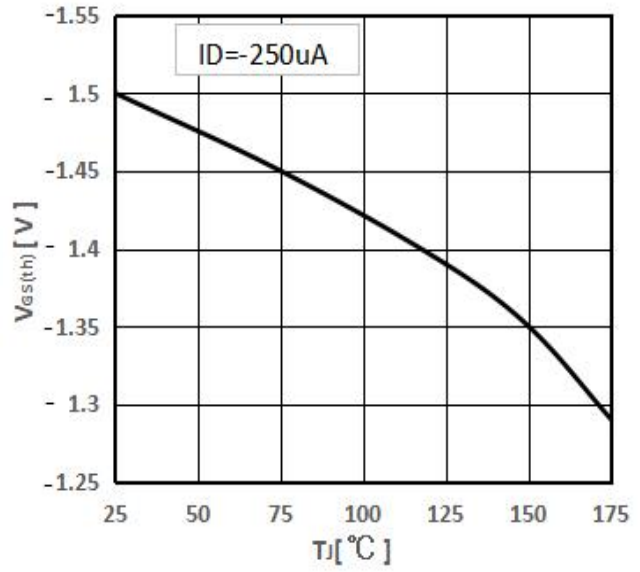
IS -- VSD



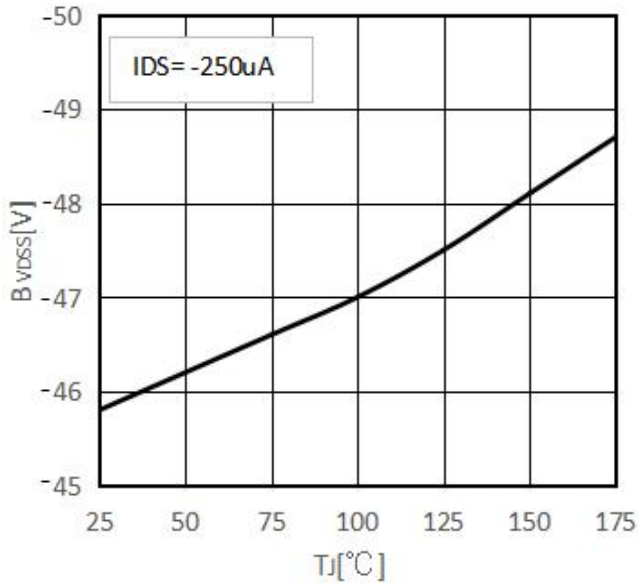
RDS(on) -- VGS



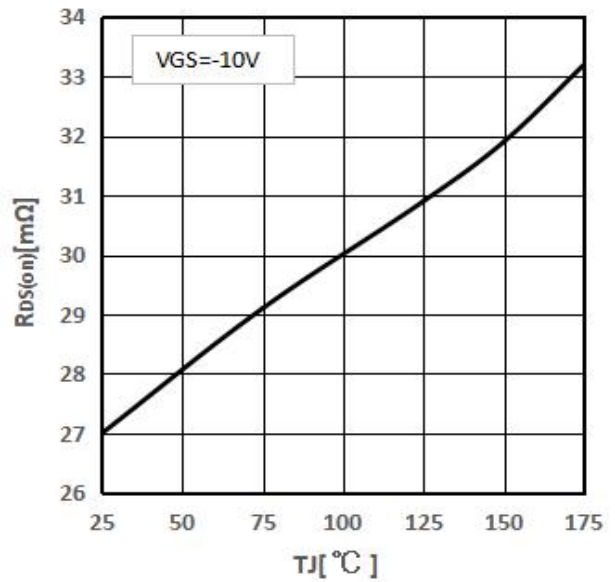
Threshold Voltage



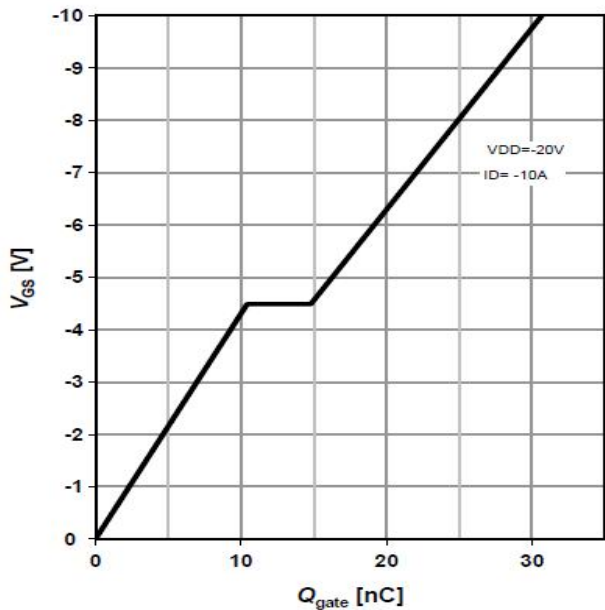
Drain-source breakdown voltage



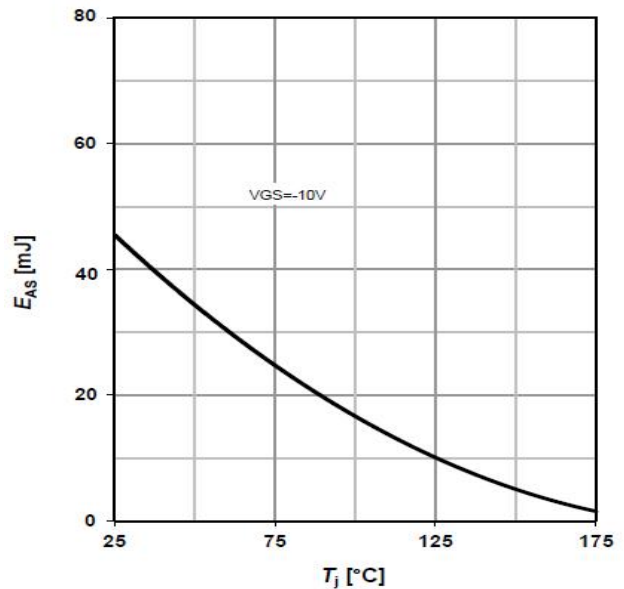
RDS (on) -- Tj



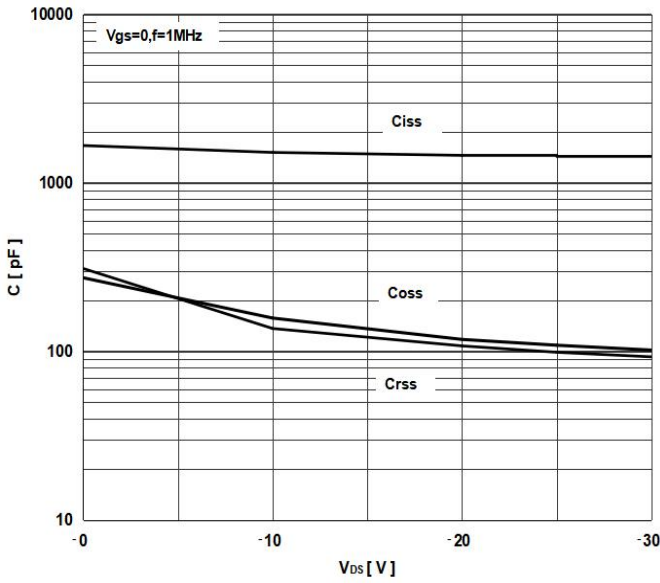
Typ.gate charge



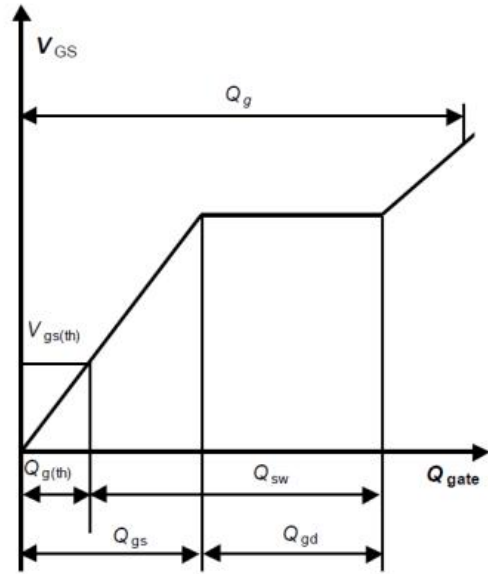
Avalanche energy



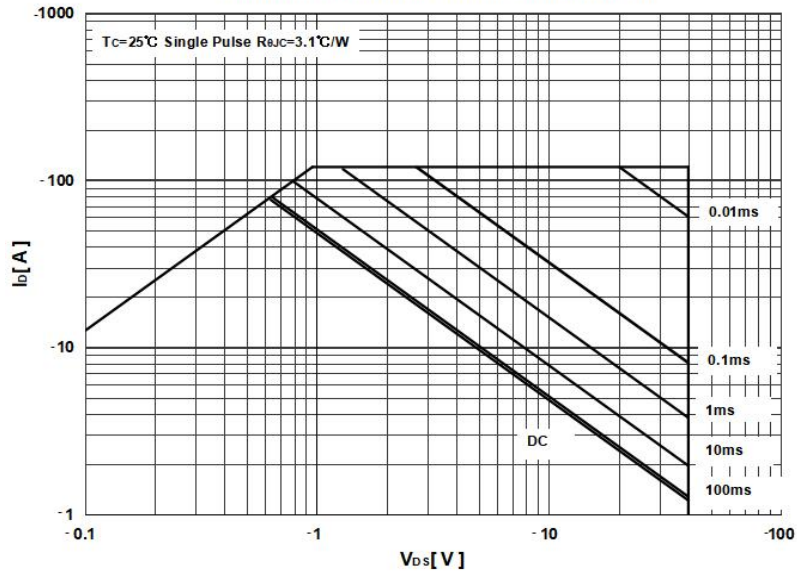
Typ. capacitance



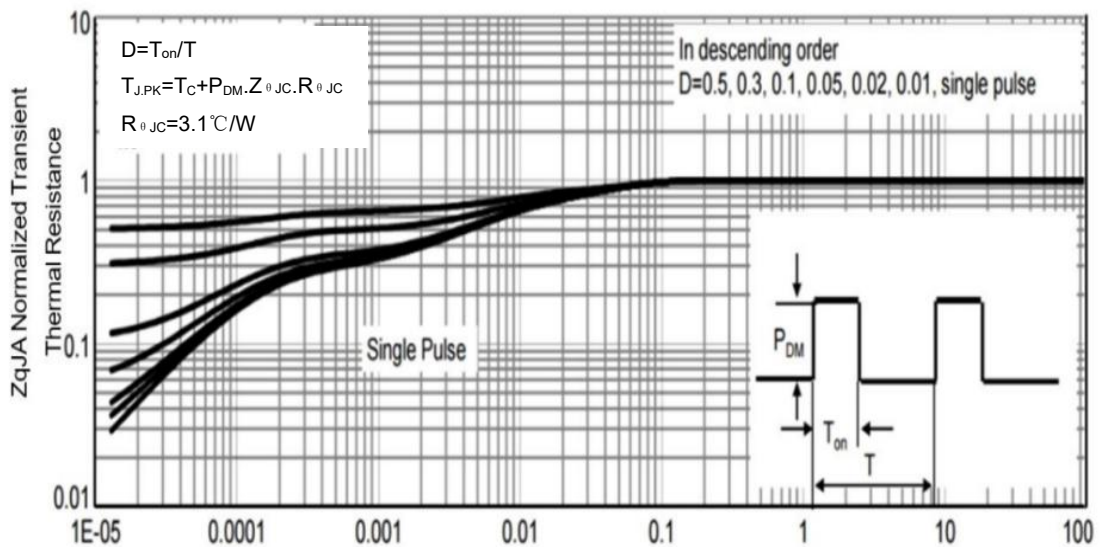
Gate charge waveforms



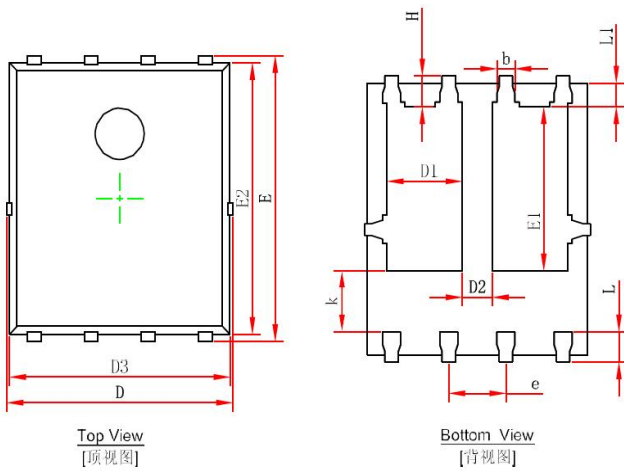
Maximum Forward Biased Safe Operating Area



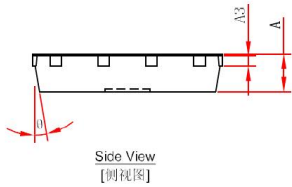
Normalized Thermal Transient Impedance



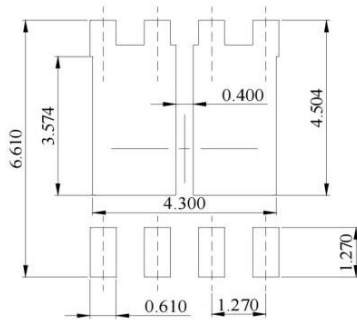
PDFN/PPAK5*6-8L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254 REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
e	10°	12°	10°	12°



PDFN/PPAK5*6-8L Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: 0.5mm.
3. The pad layout is for reference purposes only.

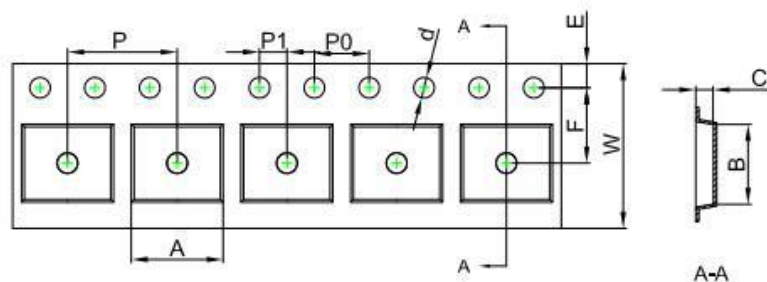
NOTICE

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PDFN/PPAK5*6-8L Tape and Reel

PDFN/PPAK5*6-8L Embossed Carrier Tape



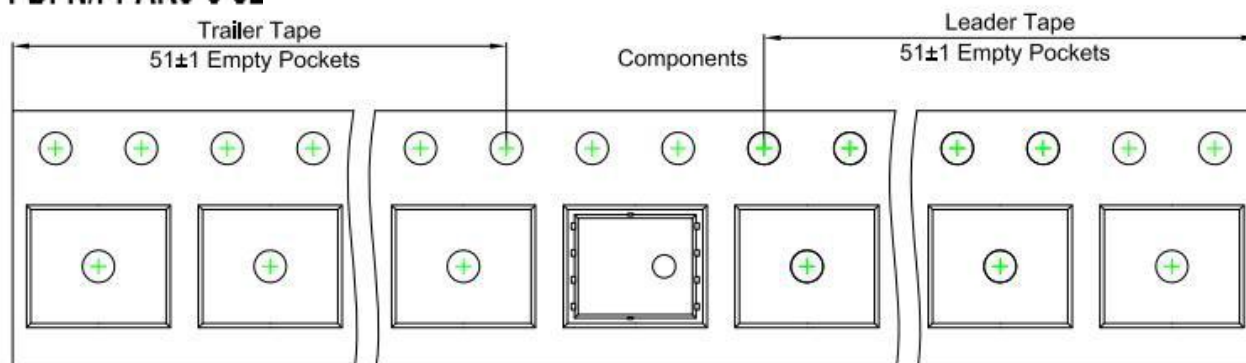
Packaging Description:

PDFN/PPAK5*6-8L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 5,000 units per 13" or 33.0 cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

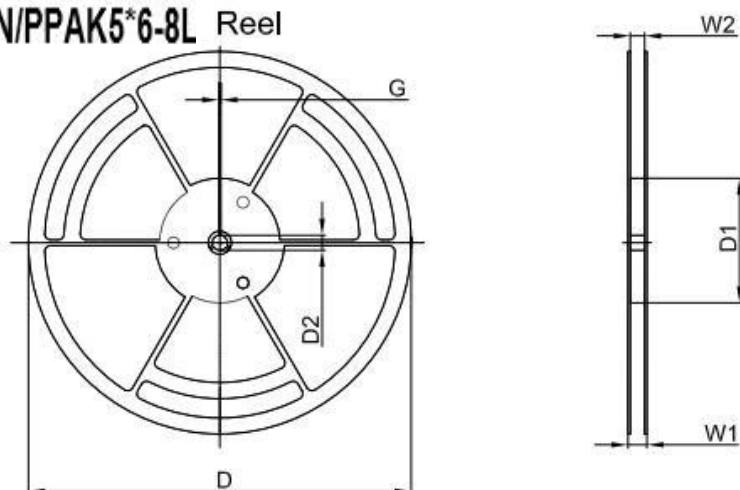
Dimensions are in millimeter

Pkg type	A	B	C	d	E	F	P0	P	P1	W
PDFN/PPAK5*6-8L	6.30	5.30	1.10	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

PDFN/PPAK5*6-8L Tape Leader and Trailer



PDFN/PPAK5*6-8L Reel



Dimensions are in millimeter

Reel Option	D	D1	D2	G	W1	W2
13"D1a	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
2022/12/06	A/0	/