



**CHONGQING CLOUDCHILD TECHNOLOGY CO., LTD**  
**TO-252-2L Plastic-Encapsulate MOSFETS**

**CCM90N4-A N-Channel Power MOSFET**

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
40 V	3.6mΩ@10V	90A
	4.5mΩ@4.5V	

**DESCRIPTION**

The CCM90N4-A uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications .

**FEATURES**

- Excellent package for good heat dissipation
- Ultra low gate charge
- Low reverse transfer capacitance
- Fast switching capability
- Avalanche energy specified
- AEC Q101 qualified

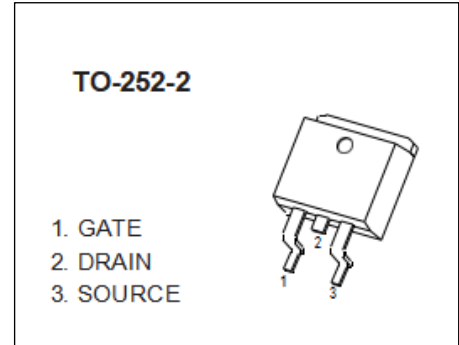
**APPLICATIONS**

- Power switching application

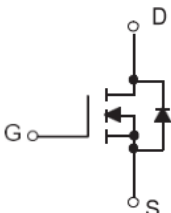
**MARKING**



CCM90N4-A =Part No.  
 XXXXXXXX = Code.



**EQUIVALENT CIRCUIT**



**ABSOLUTE MAXIMUM RATINGS( $T_c=25^{\circ}\text{C}$  unless otherwise noted)**

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>1</sup>	$I_D$	90	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	360	A
Single Pulse Avalanche Energy <sup>3</sup>	EAS	306	mJ
Total Power Dissipation <sup>1</sup>	$P_D$	60	W
Thermal Resistance from Junction to Case <sup>14</sup>	$R_{\theta JC}$	2.5	$^{\circ}\text{C}/\text{W}$
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.  $T_c=25^{\circ}\text{C}$  Limited only by maximum temperature allowed.
2.  $P_W \leq 10\mu\text{s}$ , Duty cycle  $\leq 1\%$ .
3. EAS condition:  $V_{DD}=20\text{V}, V_{GS}=10\text{V}, I_D=35\text{A}, L=0.5\text{mH}, R_g=25\Omega$  Starting  $T_J = 25^{\circ}\text{C}$ .
4. The value of  $R_{\theta JC}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_a=25^{\circ}\text{C}$ .

# MOSFET ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise specified

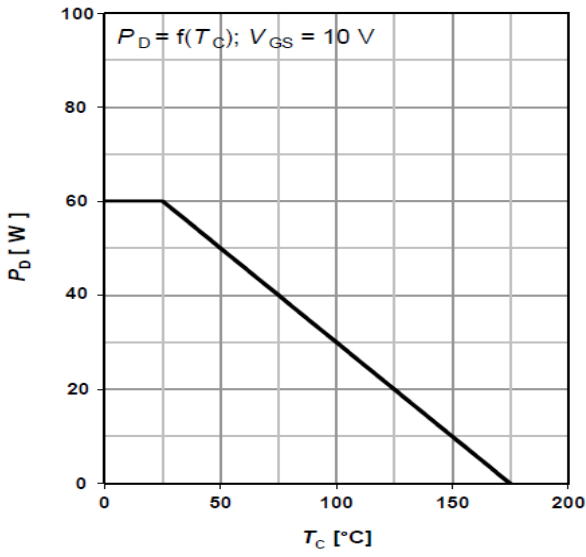
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Off characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 32V, V_{GS} = 0V$	$T_J = 25^\circ C$		1	$\mu A$
			$T_J = 125^\circ C$		10	
Gate-body leakage current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$			$\pm 100$	nA
<b>On characteristics<sup>4</sup></b>						
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.5	1.7	3.0	V
Static drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 40A$		3.6	4.5	m $\Omega$
			$V_{GS} = 4.5V, I_D = 40A$		4.5	5.0
Forward transconductance	$g_{FS}$	$V_{DS} = 10V, I_D = 10A$		15		S
<b>Dynamic characteristics<sup>34</sup></b>						
Input capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1MHz$		6500		pF
Output capacitance	$C_{oss}$			412		
Reverse transfer capacitance	$C_{rss}$			342		
Gate resistance	$R_g$	$f = 1MHz$		1.7		$\Omega$
<b>Switching characteristics<sup>34</sup></b>						
Total gate charge	$Q_g$	$V_{GS} = 10V, V_{DD} = 32V, I_D = 10A$		26.1		nC
Gate-source charge	$Q_{gs}$			4.4		
Gate-drain charge	$Q_{gd}$			8.8		
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 20V, I_D = 1A, V_{GS} = 10V, R_G = 3.3\Omega$		10.3		ns
Turn-on rise time	$t_r$			5.3		
Turn-off delay time	$t_{d(off)}$			44		
Turn-off fall time	$t_f$			9.2		
<b>Drain-Source Diode Characteristics</b>						
Drain-source diode forward voltage <sup>4</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 20A$			1.2	V
Continuous drain-source diode forward Current <sup>1</sup>	$I_S$	-			90	A
Pulsed drain-source diode forward current <sup>2</sup>	$I_{SM}$	-			360	A
Reverse recovery time	$T_{rr}$	$I_F = 20A, di/dt = 100A/\mu s$		38		ns
Reverse recovery charge	$Q_{rr}$				28	

Note :

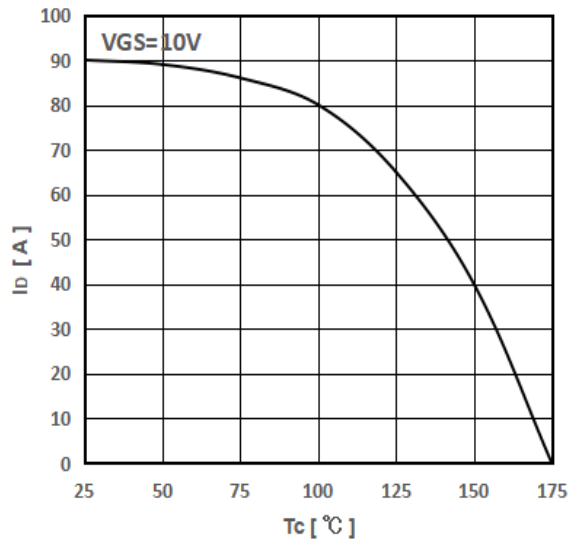
1.  $T_C = 25^\circ C$  Limited only by maximum temperature allowed.
2.  $P_w \leq 10\mu s$ , Duty cycle  $\leq 1\%$ .
3. Guaranteed by design, not subject to production.
4. Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

# Typical Characteristics

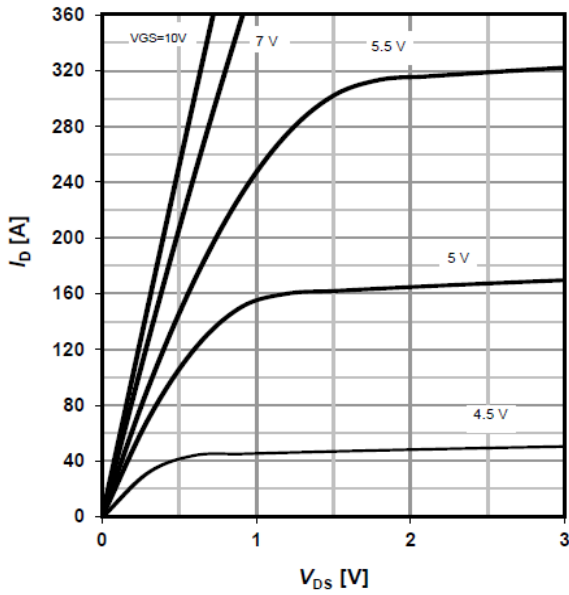
PD -- Tc



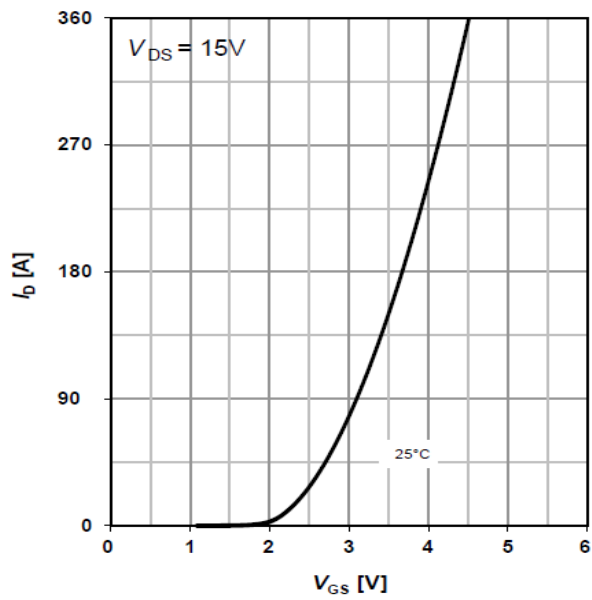
ID -- Tc



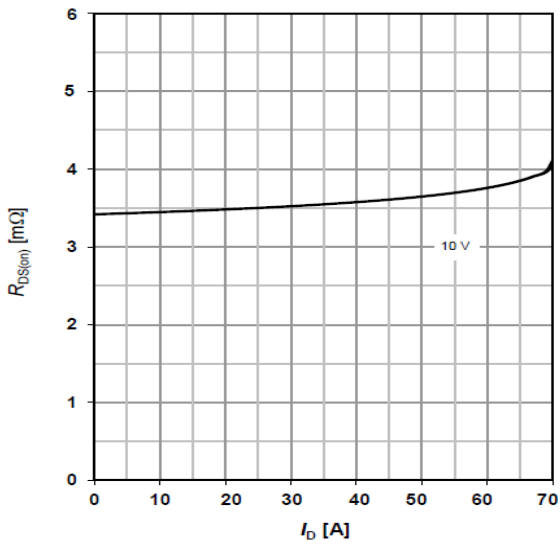
ID -- VDS



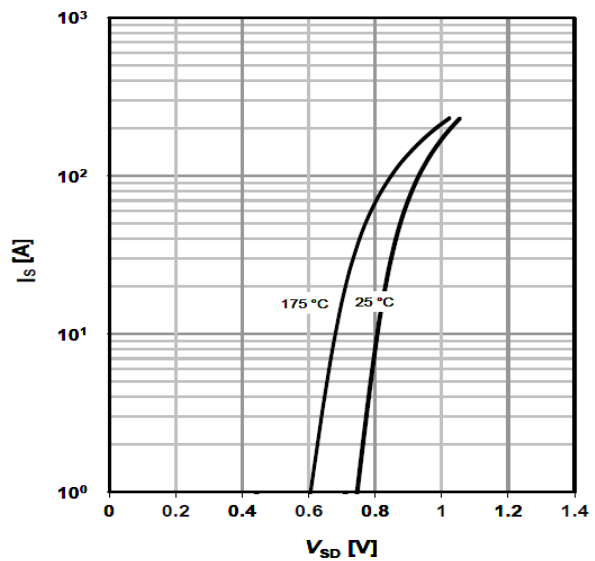
ID -- VGS



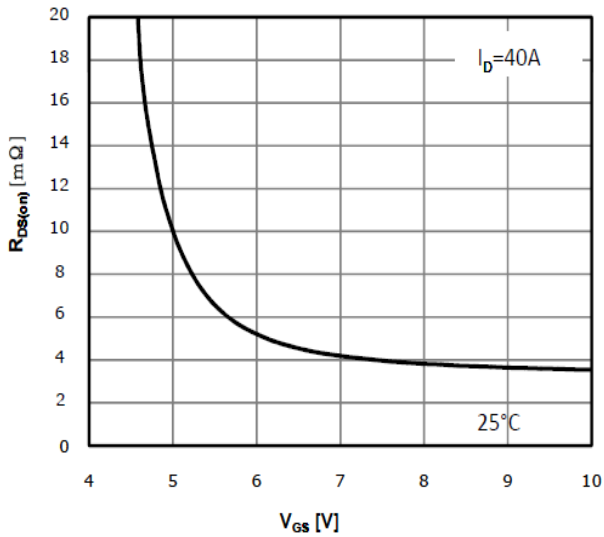
RDS(on) -- ID



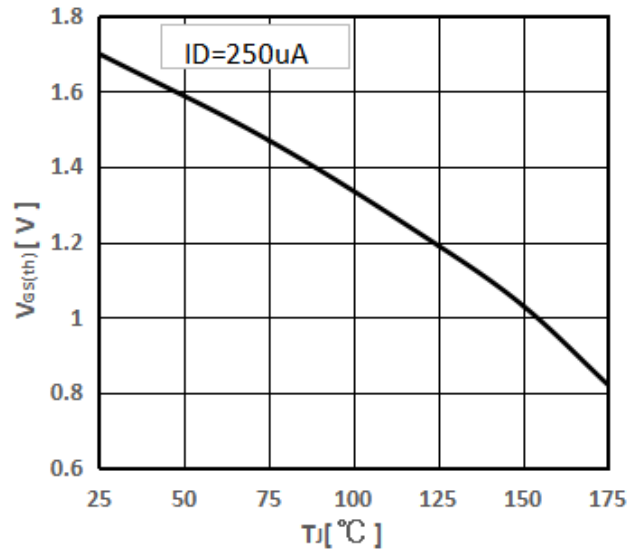
IS -- VSD



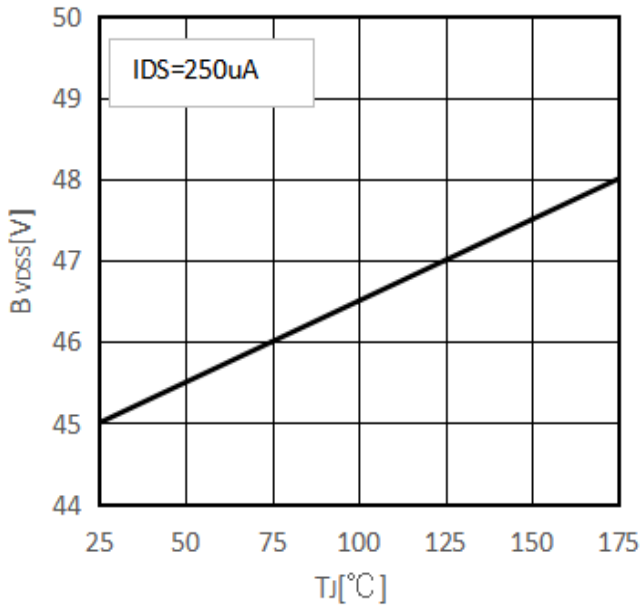
**RDS(on) -- VGS**



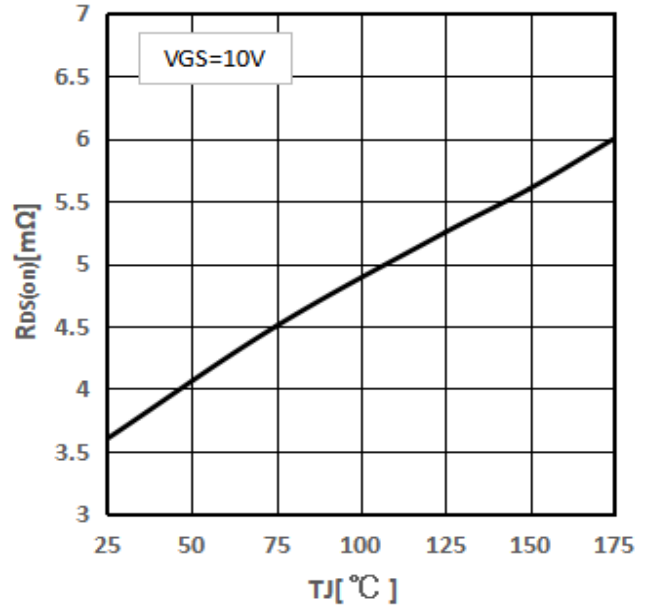
**Threshold Voltage**



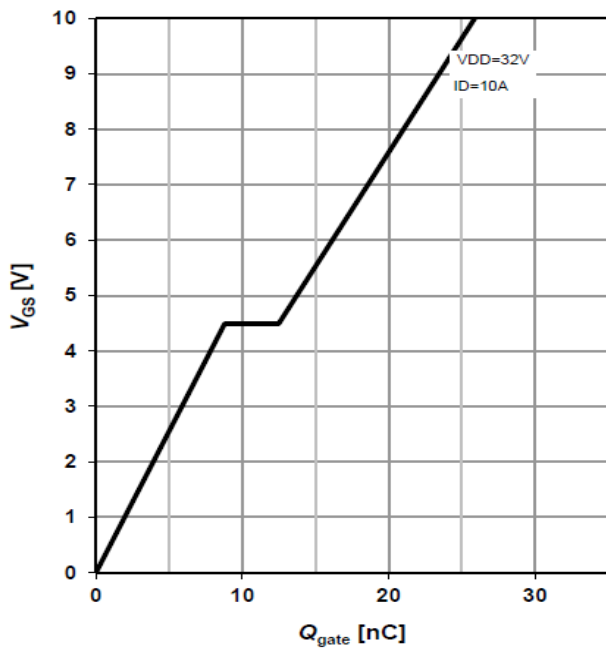
**Drain-source breakdown voltage**



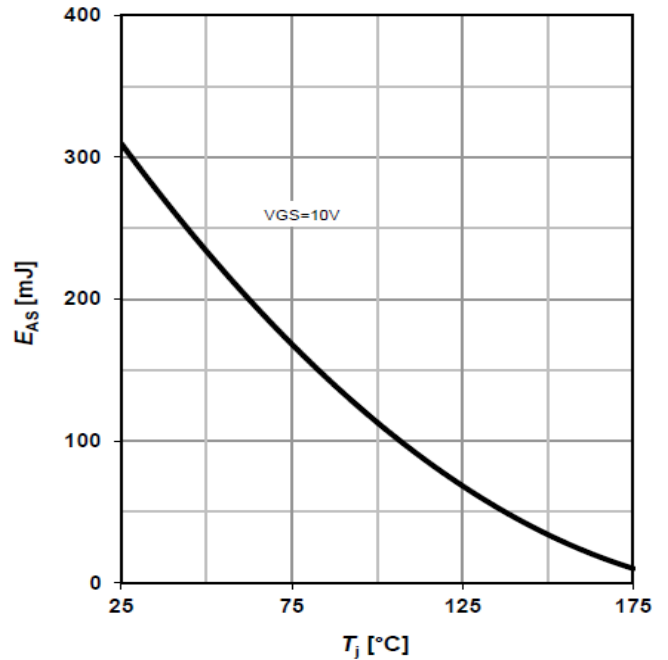
**RDS (on) -- Tj**



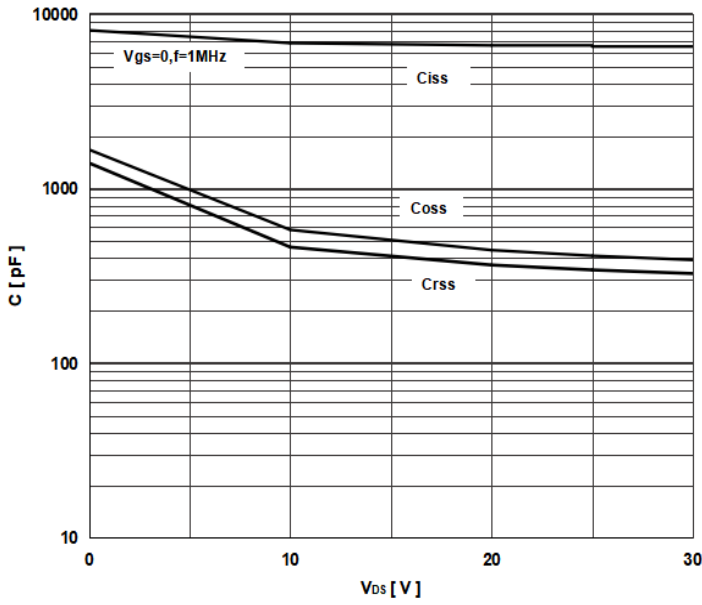
**Typ.gate charge**



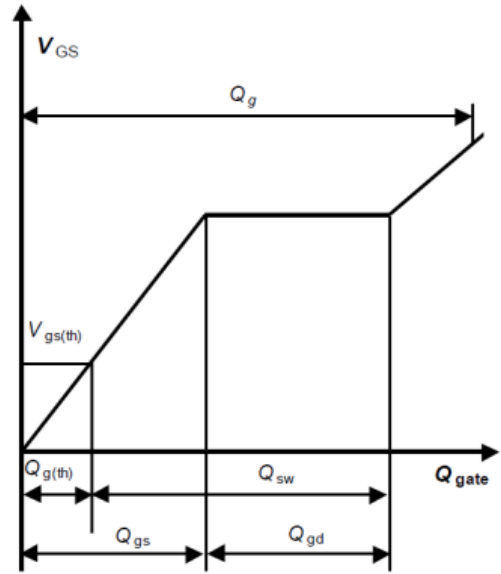
**Avalanche energy**



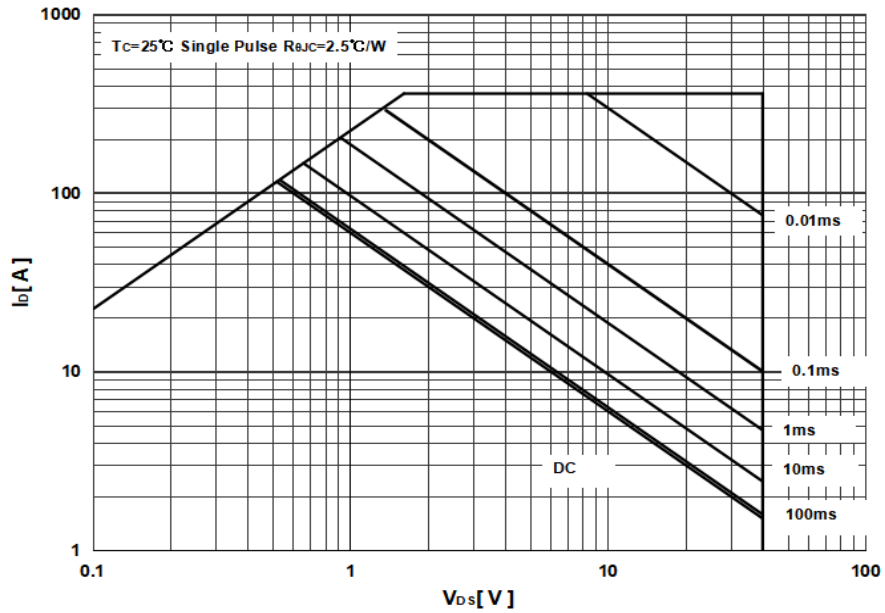
### Typ. capacitance



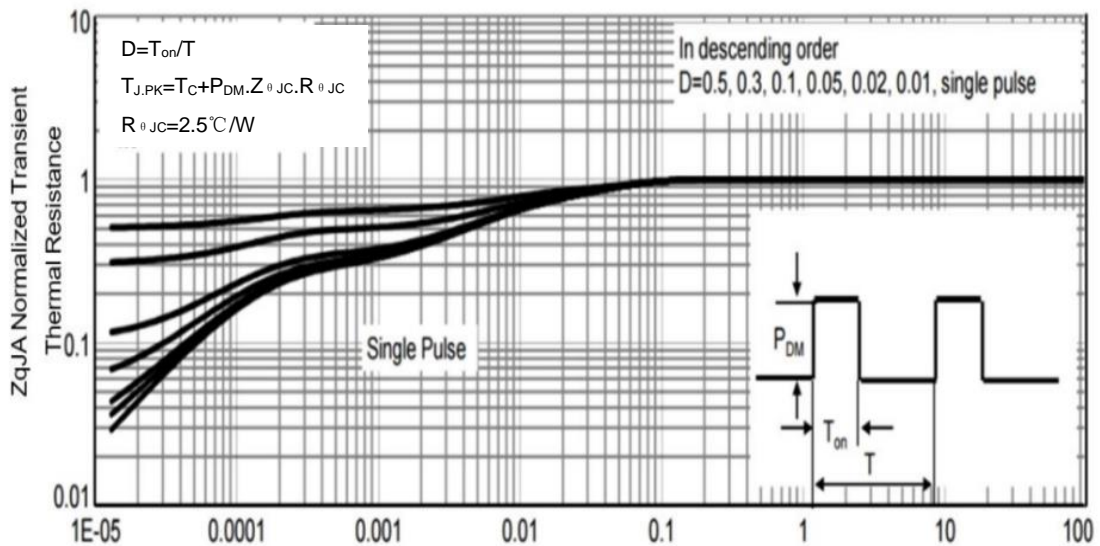
### Gate charge waveforms



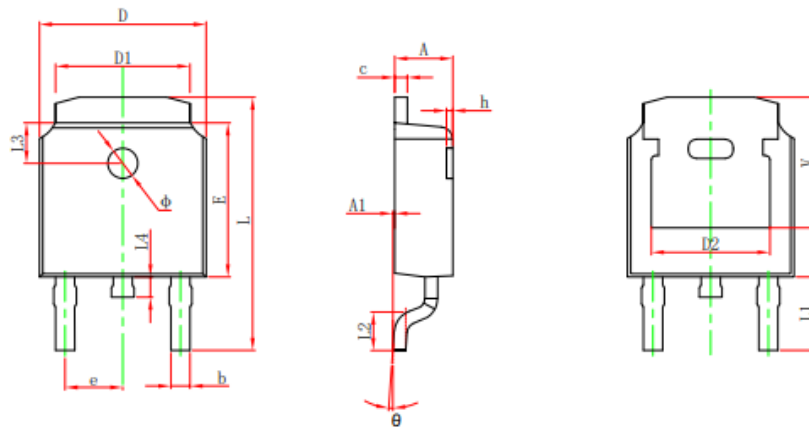
### Maximum Forward Biased Safe Operating Area



### Normalized Thermal Transient Impedance

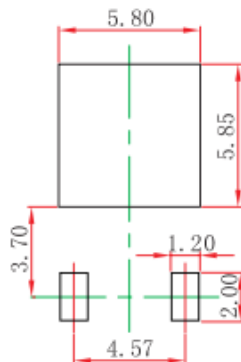


## TO-252-2L Package Outline Dimensions



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
phi	1.100	1.300	0.043	0.051
theta	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

## TO-252-2L Suggested Pad Layout



### Note:

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

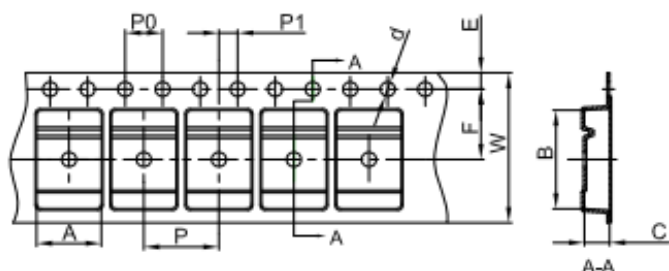
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## TO-252-2L Tape and Reel

### TO-252 Embossed Carrier Tape

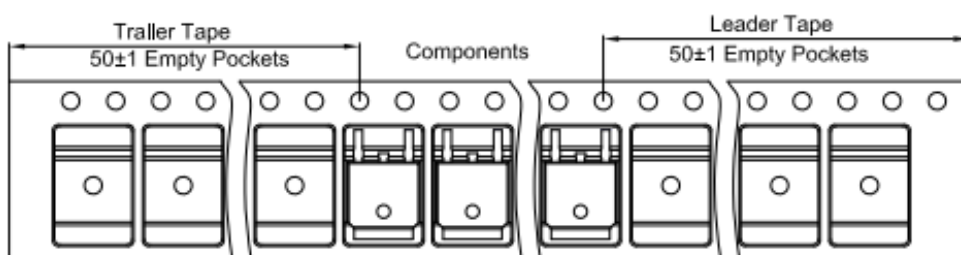


#### Packaging Description:

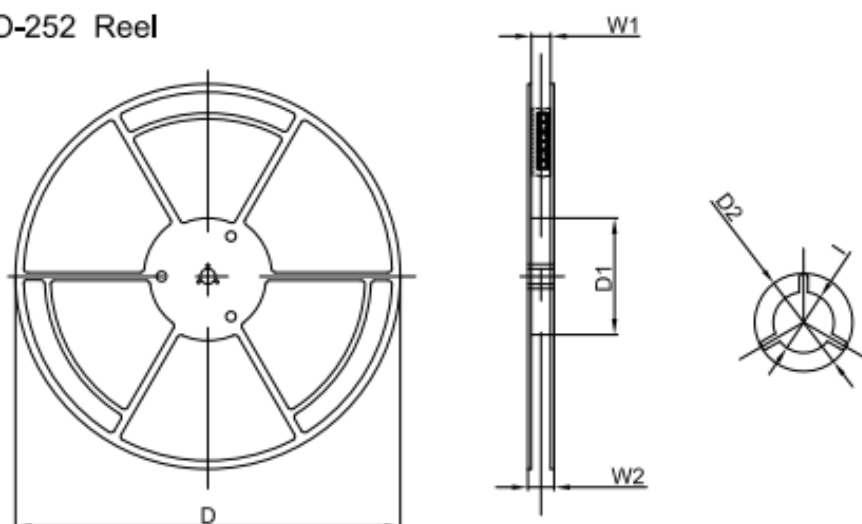
TO-252 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 25,00 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
TO-252	6.90	10.50	2.70	Ø1.55	1.75	7.50	4.00	8.00	2.00	16.00

### TO-252 Tape Leader and Trailer



### TO-252 Reel



Dimensions are in millimeter						
Reel Option	D	D1	D2	W1	W2	I
13" Dia	330.00	100.00	Ø21.00	16.40	21.00	Ø13.00

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
2,500 pcs	13Inch	2,500 pcs	340×336×29	25,000 pcs	353×346×365	



Date of change	Rev #	revise content
2022/11/16	A/0	/