

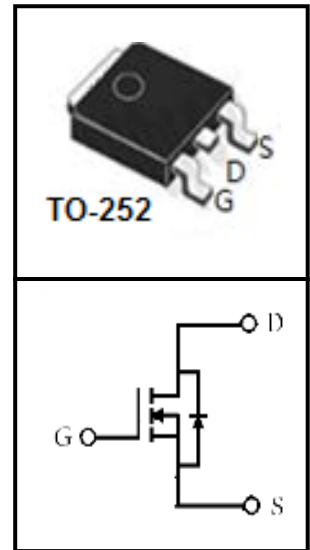
## 40V N-Channel Trench MOSFET

### FEATURES

- Super Low Gate Charge
- 100% EAS Guaranteed
- RoHS compliant
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

### APPLICATIONS

- Load Switching
- Hard switched and high frequency circuits
- Uninterruptible power supply



### Device Marking and Package Information

Device	Package	Marking
CTD04N004	TO-252	CTD04N004

### Absolute Maximum Ratings at $T_j = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage ( $V_{GS} = 0\text{V}$ )	$V_{DSS}$	40	V
Drain Current-Continuous( $T_c = 25^\circ\text{C}$ )	$I_D$	140	A
Drain Current-Continuous( $T_c = 100^\circ\text{C}$ )		90	
Pulsed Drain Current	$I_{DM}$	560	A
Gate Source Voltage	$V_{GSS}$	$\pm 20$	V
Single Pulse Avalanche Energy	$E_{AS}$	183	mJ
Power Dissipation $T_c = 25^\circ\text{C}$	$P_D$	77	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+175	$^\circ\text{C}$

### Thermal Characteristics

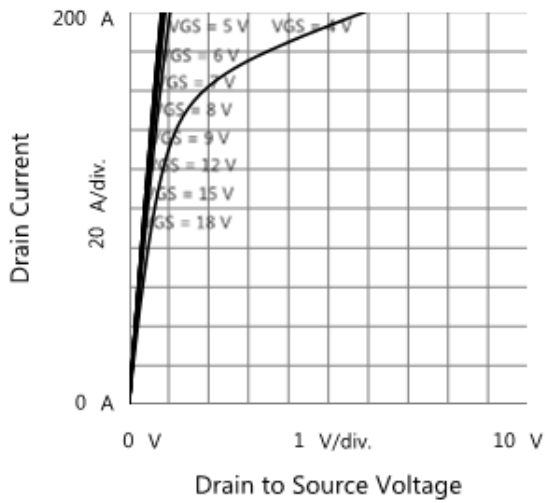
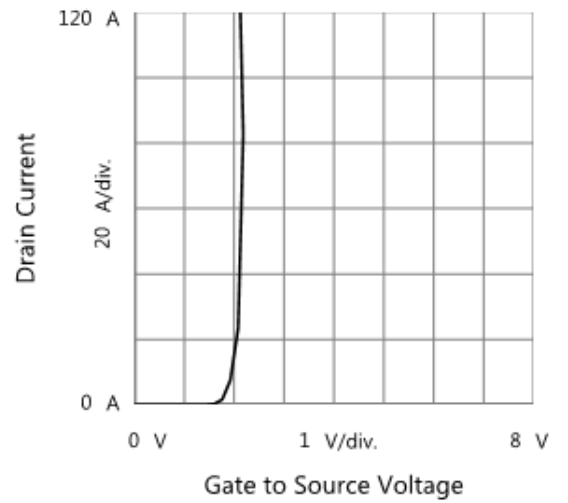
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-Case (note1)	$R_{\theta JC}$	2.3	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction-Ambient 1 ( $t \leq 10\text{s}$ ) (note1)	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$

Electrical Characteristics $T_j = 25^\circ\text{C}$ unless otherwise specified						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	$\mu A$
Zero Gate Voltage Drain Current		$V_{DS} = 40V, V_{GS} = 0V, T_J = 55^\circ\text{C}$	--	--	5	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.2	--	2.5	V
Drain-Source On-Resistance (note2)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 60A$	--	3.4	4	$m\Omega$
		$V_{GS} = 4.5V, I_D = 40A$	--	4.4	6	$m\Omega$
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 15V,$ $f = 1.0MHz$	--	4883	--	$\mu F$
Output Capacitance	$C_{oss}$		--	681	--	
Reverse Transfer Capacitance	$C_{rss}$		--	525	--	
Total Gate Charge (4.5V)	$Q_g$	$V_{DS} = 32V, I_D = 80A,$ $V_{GS} = 10V$	--	102	--	nC
Gate-Source Charge	$Q_{gs}$		--	21	--	
Gate-Drain Charge	$Q_{gd}$		--	52	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = 20V, V_{GS} = 10V,$ $R_G = 3.5\Omega$	--	35	--	ns
Turn-on Rise Time	$t_r$		--	6	--	
Turn-off Delay Time	$t_{d(off)}$		--	120	--	
Turn-off Fall Time	$t_f$		--	40	--	
<b>Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	140	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	560	
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 60A, V_{GS} = 0V$	0.4	--	1	V

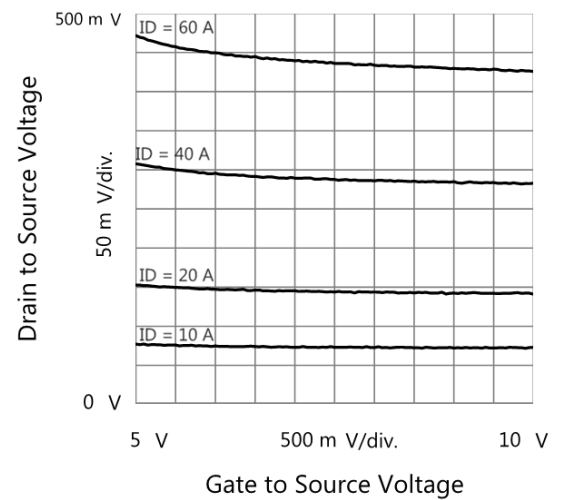
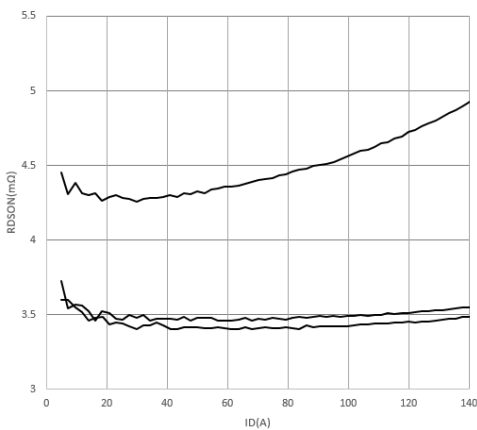
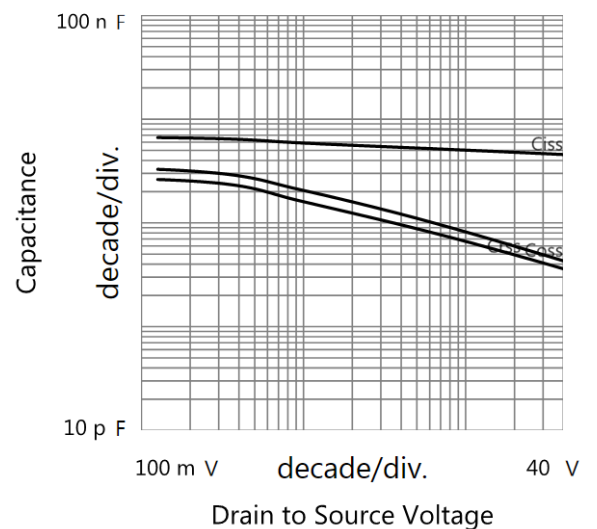
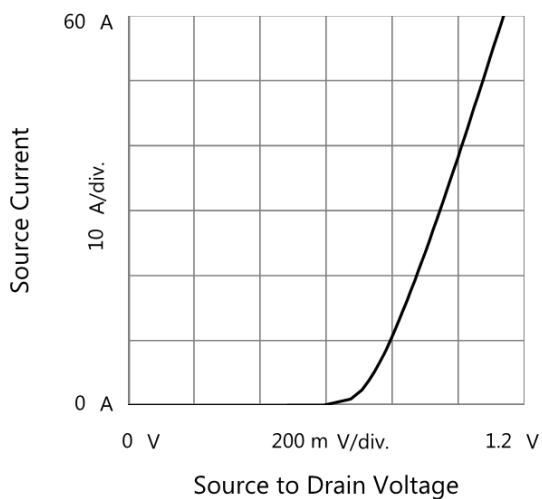
**Notes**

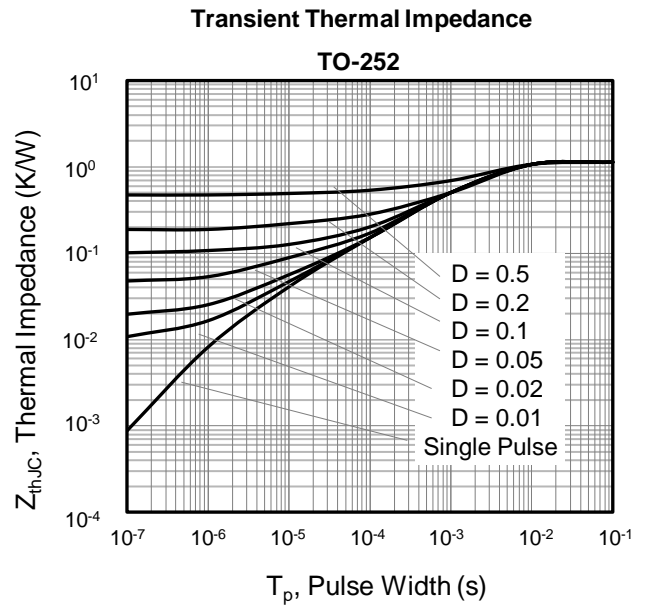
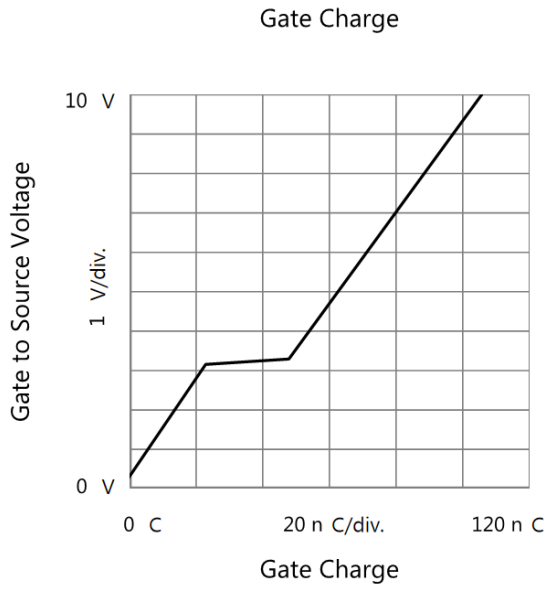
1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width $\leq 300\mu s$  , duty cycle $\leq 2\%$
3. The EAS data shows Max. rating . The test condition is  $V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH$
4. The power dissipation is limited by  $175^\circ\text{C}$  junction temperature
5. The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

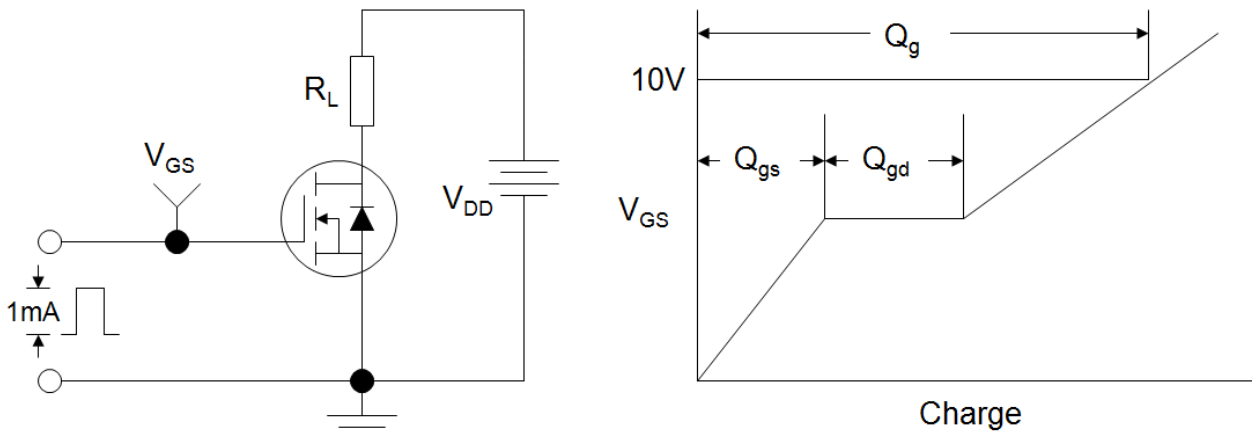
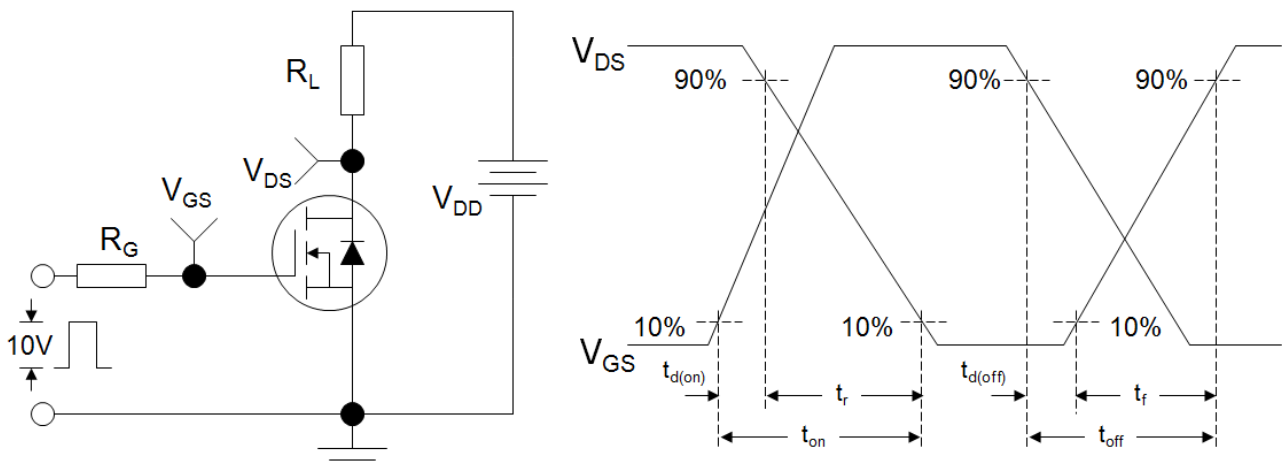
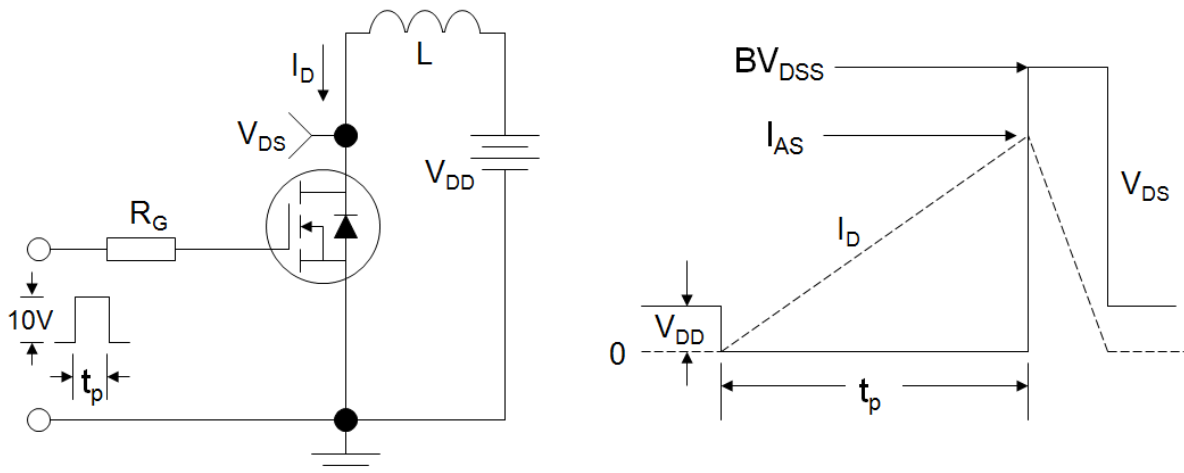
**Typical Characteristics**  $T_J = 25^{\circ}\text{C}$ , unless otherwise noted

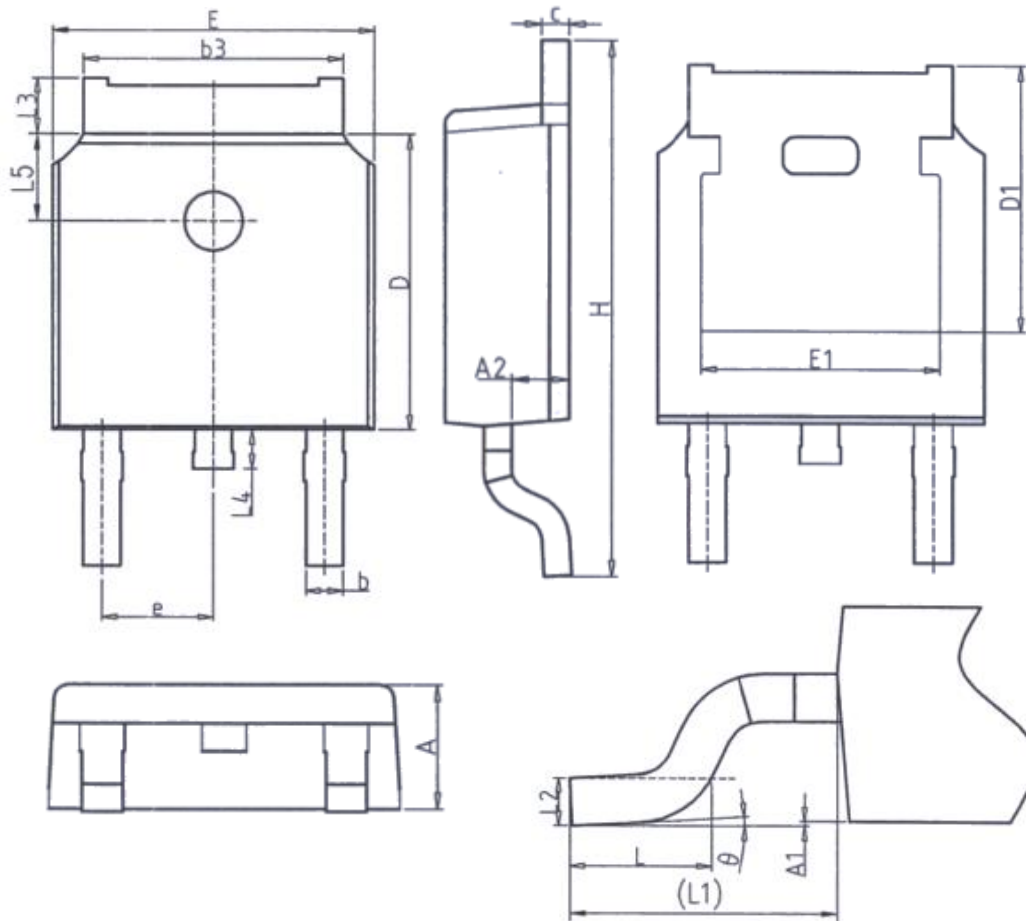
**Output Characteristics**

**Transfer Characteristics**


Drain to Source Voltage vs. Gate to Source Voltage

**Drain to Source Resistance vs. Drain Current**

**Capacitances**
**Body Diode Forward Characteristics**


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted


**Figure A: Gate Charge Test Circuit and Waveform**

**Figure B: Resistive Switching Test Circuit and Waveform**

**Figure C: Unclamped Inductive Switching Test Circuit and Waveform**


**TO-252**


Unit: mm		
Symbol	Min.	Max.
A	2.20	2.40
A1	0.00	0.20
A2	0.97	1.17
b	0.68	0.90
b3	5.20	5.50
c	0.43	0.63
D	5.98	6.22
D1	5.30REF	
E	6.40	6.80
E1	4.63	-

Unit: mm		
Symbol	Min.	Max.
e	2.286BSC	
H	9.40	10.50
L	1.38	1.75
L1	2.90REF	
L2	0.51BSC	
L3	0.88	1.28
L4	-	1.00
L5	1.65	1.95
θ	0°	8°

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