



P-Channel Enhancement MOSFET

Features

- Drain-Source Breakdown Voltage V_{DS} - 20 V
- Drain-Source On-Resistance
 - $R_{DS(ON)}$ 85m Ω , at $V_{GS} = -4.5V$, $I_{DS} = -3.0A$
 - $R_{DS(ON)}$ 100m Ω , at $V_{GS} = -2.5V$, $I_{DS} = -2.0A$
- Continuous Drain Current at $T_A=25^\circ C$ $I_D = -3.0A$
- Advanced high cell density Trench Technology
- RoHS Compliance & Halogen Free

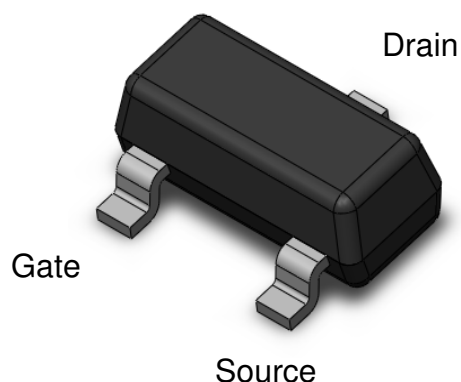
Applications

- Power Management
- Portable Equipment
- Battery Powered System
- Load Switch

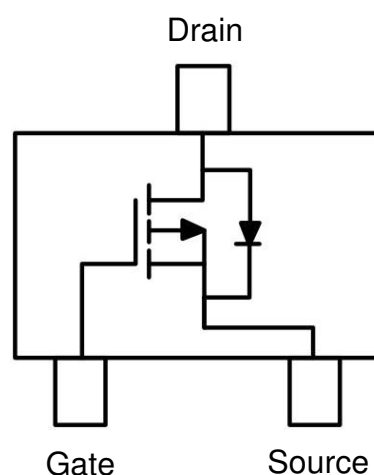
Description

The CT2301-R3 uses high performance Trench Technology to provide excellent $R_{DS(ON)}$ and low gate charge which is suitable for most of the synchronous buck converter applications .

Package Outline



Schematic



**Absolute Maximum Rating at 25°C**

Symbol	Parameters	Ratings	Units	Notes
V_{DS}	Drain-Source Voltage	-20	V	
V_{GS}	Gate-Source Voltage	± 12	V	
I_D	Continuous Drain Current @ $T_A=25^\circ\text{C}$	-3.0	A	1
I_{DM}	Pulsed Drain Current	-12	A	1
P_D	Total Power Dissipation	1.25	W	2
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$	

Thermal Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$R_{\theta JA}$	Thermal Resistance Junction-Ambient (t=10s)		-	200	-	$^\circ\text{C}/\text{W}$	1,4

**Electrical Characteristics** $T_A = 25^\circ\text{C}$ (unless otherwise specified)**Static Characteristics**

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$B_{V_{DS}}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D = -0.25\mu A$	-20	-	-	V	
I_{DSS}	Drain-Source Leakage Current	$V_{DS} = -20V, V_{GS} = 0V$	-	-	-1	μA	
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm 12V, V_{DS} = 0V$	-	-	± 100	nA	

On Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$R_{DS(ON)}$	Drain-Source On-Resistance	$V_{GS} = -4.5V, I_D = -3.0A$	-	85	100	m	3
		$V_{GS} = -2.5V, I_D = -2.0A$	-	100	150	m	
$V_{GS(TH)}$	Gate-Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = -0.25\mu A$	-0.4	-	-0.9	V	3

Dynamic Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
C_{ISS}	Input Capacitance	$V_{DS} = -8V,$ $V_{GS} = 0V,$ $f = 1MHz$	-	640	-	pF	
C_{OSS}	Output Capacitance		-	59	-		
C_{RSS}	Reverse Transfer Capacitance		-	70	-		

Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$T_{D(ON)}$	Turn-On Delay Time	$V_{DS} = -10V, V_{GS} = -4.5V,$ $R_G = 4.7\Omega, I_D = -2.8A$	-	4	-	ns	
T_R	Rise Time		-	28.2	-		
$T_{D(OFF)}$	Turn-Off Delay Time		-	27.1	-		
T_F	Fall Time		-	9.2	-		
Q_G	Total Gate Charge	$V_{DS} = -4.5V, V_{GS} = -10V,$ $I_D = -2.8A$	-	7.65	-	nC	
Q_{GS}	Gate-Source Charge		-	1.1	-		
Q_{GD}	Gate-Drain (Miller) Charge		-	1.95	-		

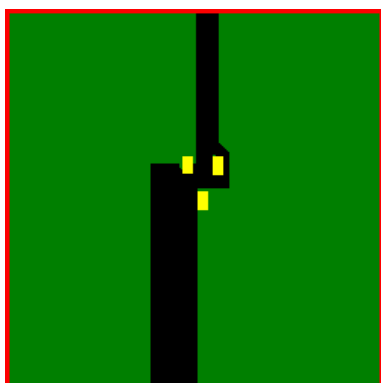


Drain-Source Diode Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V _{SD}	Body Diode Forward Voltage	V _{GS} = 0V, I _{SD} = -2.8A			1.2	V	
I _{SD}	Body Diode Continuous Current				-2.8	A	1

Note:

1. The power dissipation is limited by 150°C junction temperature.
2. Device mounted on a glass-epoxy board



FR-4
25.4 × 25.4 mm .
2 Oz Copper

Actual Size

3. The data tested by pulsed , pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
4. Thermal Resistance follow JESD51-3.



Typical Characteristic Curves

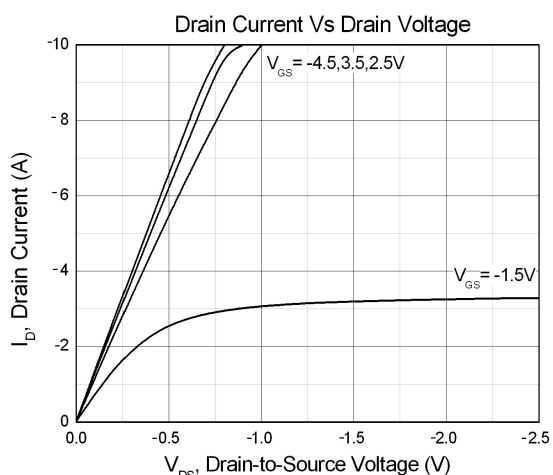


Figure 1

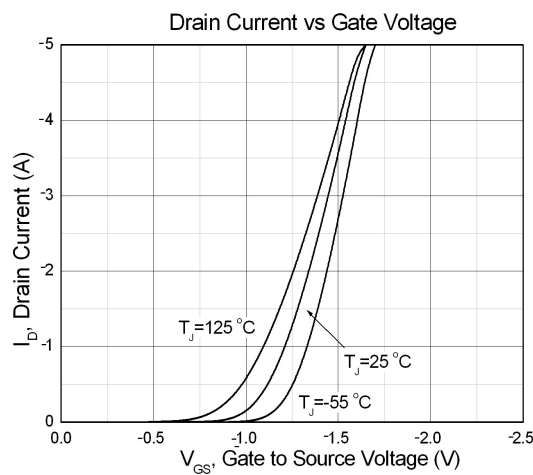


Figure 2

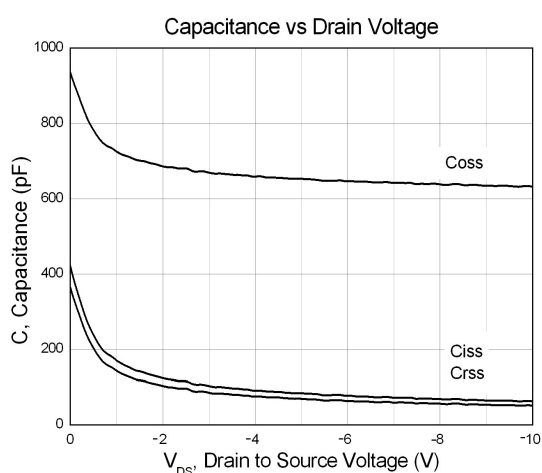


Figure 3

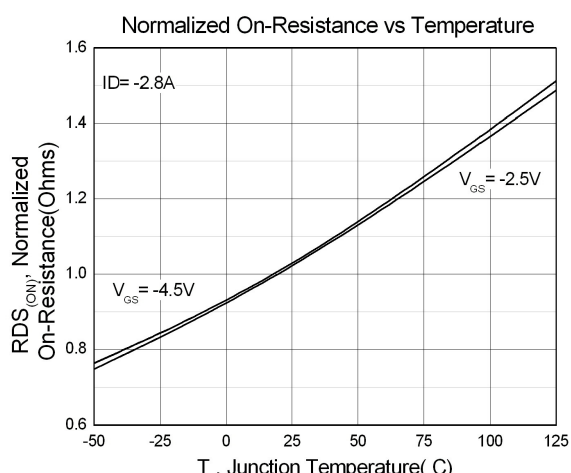


Figure 4

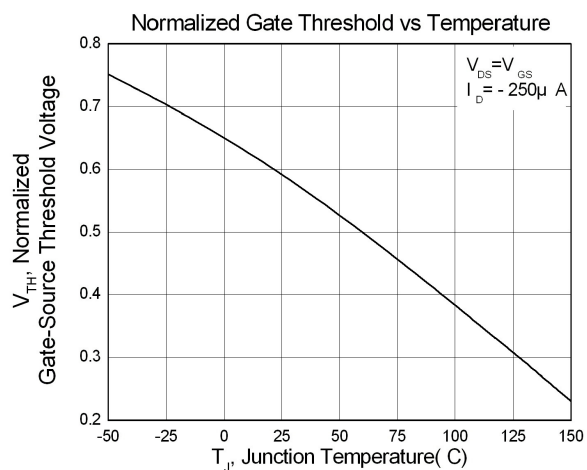


Figure 5

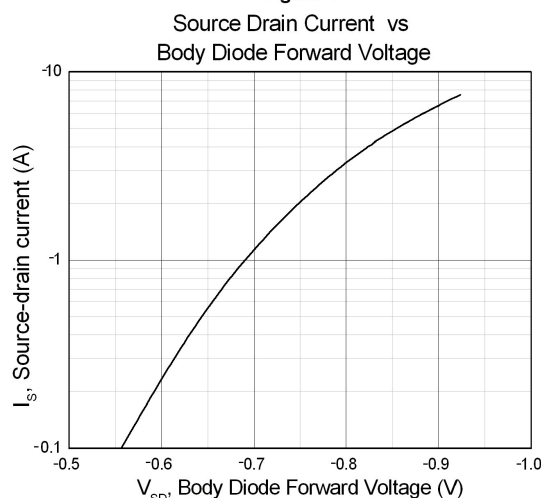
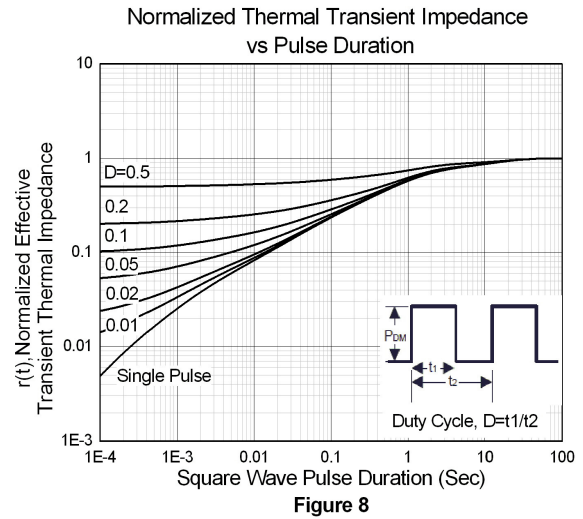
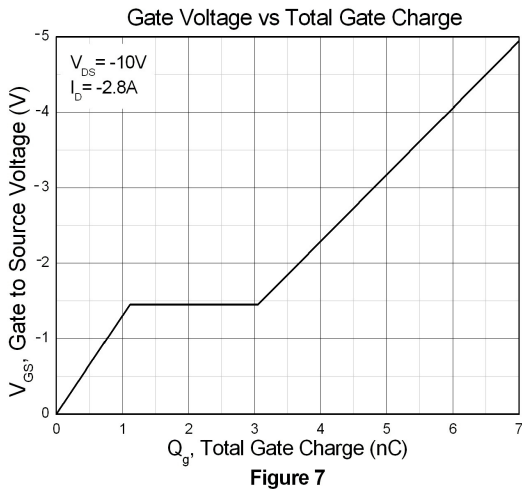


Figure 6



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Test Circuits & Waveforms

Figure 9: Gate Charge Test Circuit

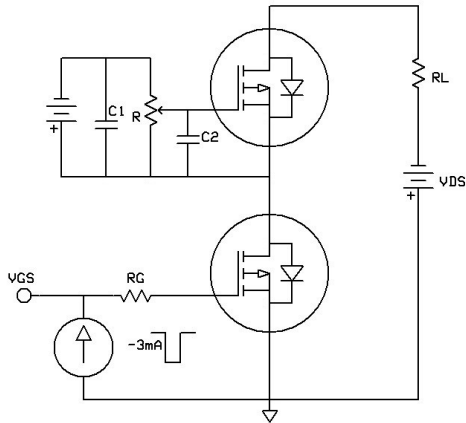


Figure 10: Gate Charge Waveform

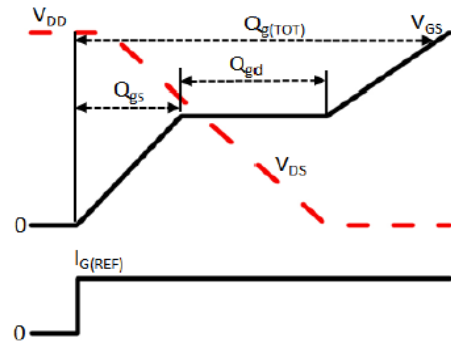


Figure 11: Switching Time Test Circuit

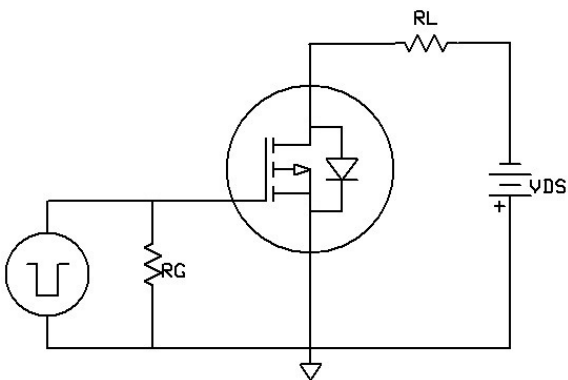
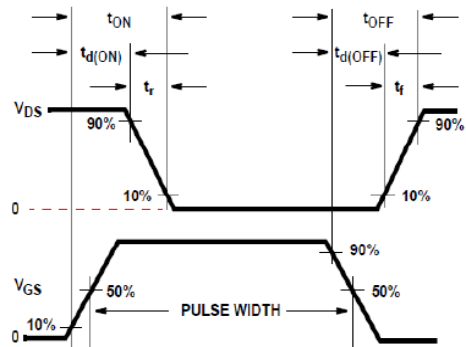
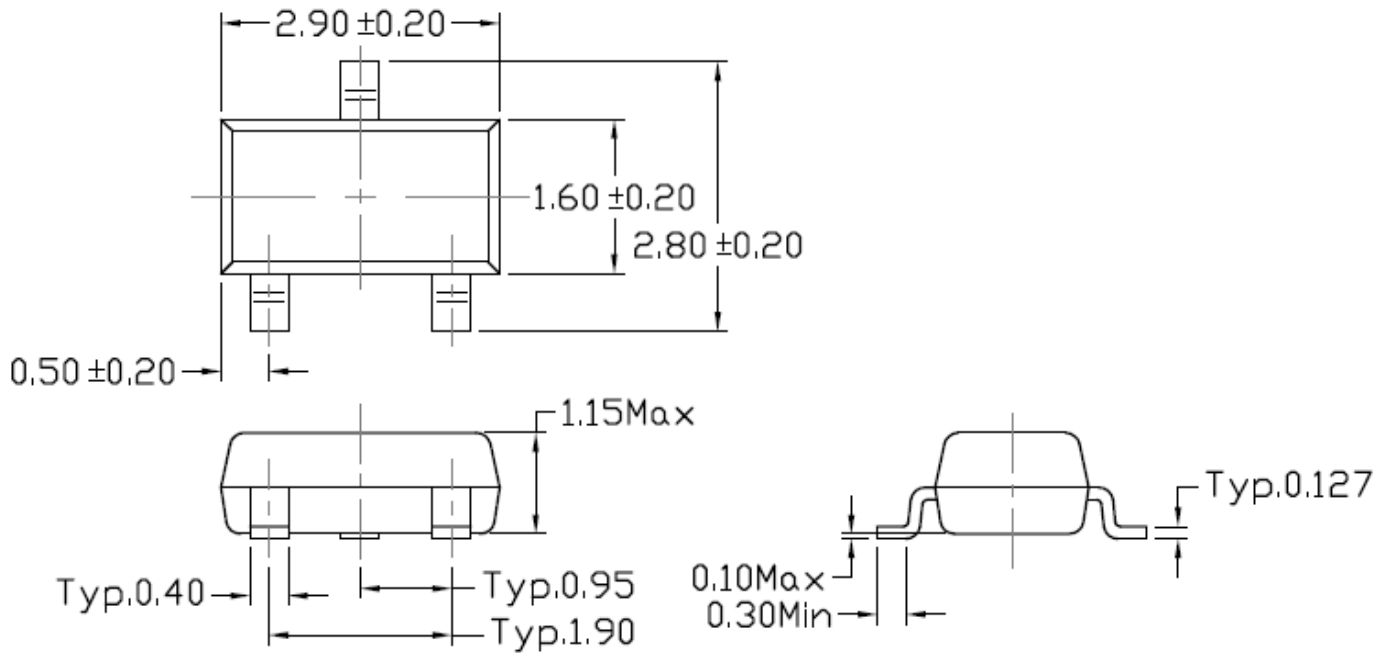


Figure 12: Switching Time Waveform



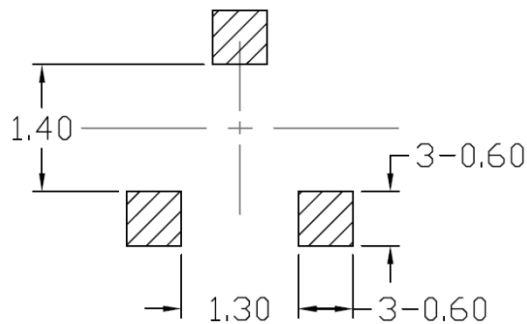


Package Dimension (SC-59)



Note: Dimensions in mm

Recommended pad layout for surface mount leadform



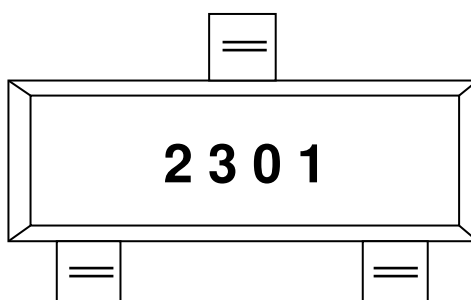
Note: Dimensions in mm



CT2301-R3

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Marking Information



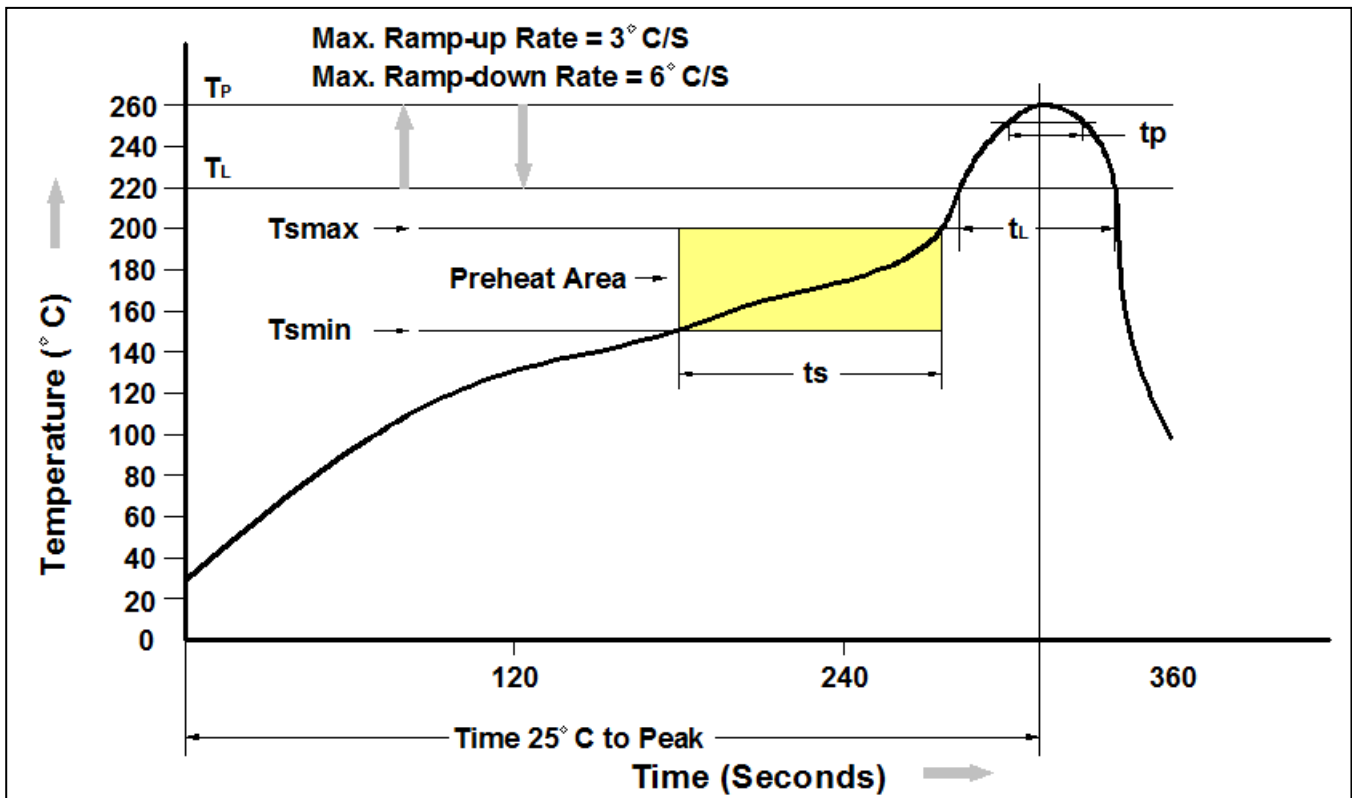
2301 : Device Number

Ordering Information

<i>Part Number</i>	<i>Description</i>	<i>Quantity</i>
CT2301-R3	SC-59 Reel	3000 pcs



Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{min})	150 °C
Temperature Max. (T _{max})	200 °C
Time (t _s) from (T _{min} to T _{max})	60-120 seconds
Ramp-up Rate (t _L to t _P)	3 °C/second max.
Liquidous Temperature (T _L)	217 °C
Time (t _L) Maintained Above (T _L)	60 – 150 seconds
Peak Body Package Temperature	260 °C +0 °C / -5 °C
Time (t _P) within 5 °C of 260 °C	30 seconds
Ramp-down Rate (T _P to T _L)	6 °C/second max
Time 25 °C to Peak Temperature	8 minutes max.



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