
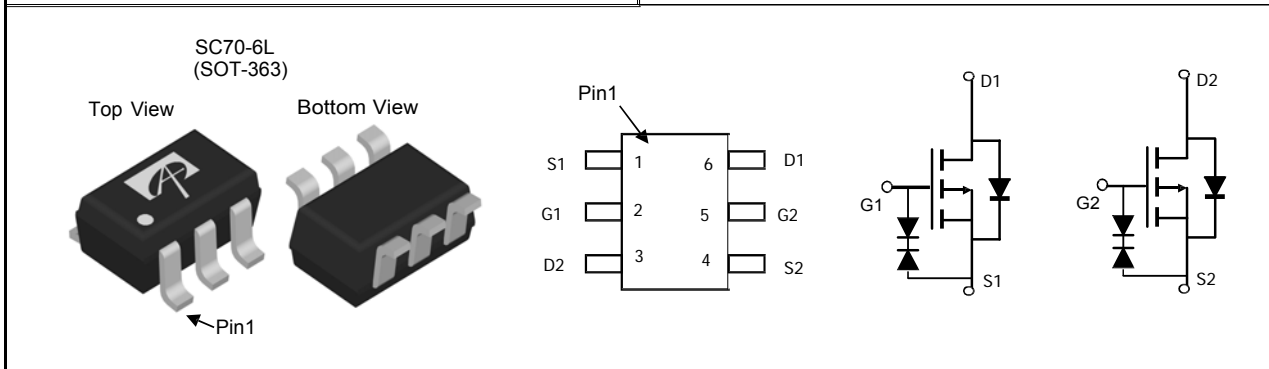


## HM2301BWKR

### Dual P-Channel Enhancement Mode Field Effect Transistor

<p><b>General Description</b></p> <p>The HM2301BWKR uses advanced trench technology to provide excellent <math>R_{DS(ON)}</math>, low gate charge, and operation with gate voltages as low as 1.8V, in the small SOT363 footprint. It can be used for a wide variety of applications, including load switching, low current inverters and low current DC-DC converters. It is ESD protected to 2KV HBM.</p>	<p><b>Features</b></p> <p><math>V_{DS} (V) = -20V</math>  <math>I_D = -0.8A (V_{GS} = -4.5V)</math></p> <p><math>R_{DS(ON)} &lt; 480m (V_{GS} = -4.5V)</math>  <math>R_{DS(ON)} &lt; 950m (V_{GS} = -2.5V)</math>  <math>R_{DS(ON)} &lt; 2200m (V_{GS} = -1.8V)</math></p> 
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**Absolute Maximum Ratings**  $T_A=25^\circ C$  unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current <sup>A</sup>	$I_D$	$T_A=25^\circ C$	-0.8
		$T_A=70^\circ C$	-0.56
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	-2.4	A
Power Dissipation <sup>A</sup>	$P_D$	$T_A=25^\circ C$	0.3
		$T_A=70^\circ C$	0.19
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{JA}$	360	415	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	400	460
Maximum Junction-to-Lead <sup>C</sup>	$R_{JL}$	300	350	$^\circ C/W$

Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=-250\text{ A}, V_{GS}=0\text{V}$	-20			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-16\text{V}, V_{GS}=0\text{V}$			-1	A
		$T_J=55^\circ\text{C}$			-5	
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 8\text{V}$			$\pm 10$	A
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\text{ A}$	-0.45		-1.2	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-4.5\text{V}, V_{DS}=-5\text{V}$	-3			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5\text{V}, I_D=-0.8\text{A}$		350	480	m
		$T_J=125^\circ\text{C}$		440	670	
		$V_{GS}=-2.5\text{V}, I_D=-0.5\text{A}$		550	950	m
		$V_{GS}=-1.8\text{V}, I_D=-0.4\text{A}$		780	2200	m
$g_{FS}$	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-0.8\text{A}$		1.7		S
$V_{SD}$	Diode Forward Voltage	$I_S=-0.5\text{A}, V_{GS}=0\text{V}$		-0.86	-1	V
$I_S$	Maximum Body-Diode Continuous Current				-0.4	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-10\text{V}, f=1\text{MHz}$		114	140	pF
$C_{oss}$	Output Capacitance			17		
$C_{rss}$	Reverse Transfer Capacitance			14		
$R_g$	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		12	17	
<b>SWITCHING PARAMETERS</b>						
$Q_g$	Total Gate Charge	$V_{GS}=-4.5\text{V}, V_{DS}=-10\text{V}, I_D=-0.8\text{A}$		1.44	1.8	nC
$Q_{gs}$	Gate Source Charge			0.14		
$Q_{gd}$	Gate Drain Charge			0.35		
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-4.5\text{V}, V_{DS}=-10\text{V},$ $R_L=16.7, R_{GEN}=3$		6.5		ns
$t_r$	Turn-On Rise Time			6.5		
$t_{D(off)}$	Turn-Off DelayTime			18.2		
$t_f$	Turn-Off Fall Time			5.5		
$t_{rr}$	Body Diode Reverse Recovery Time		$I_F=-0.8\text{A}, di/dt=100\text{A/s}$		10	
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=-0.8\text{A}, di/dt=100\text{A/s}$		3		nC

A: The value of  $R_{JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The value in any a given application depends on the user's specific board design. The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The  $R_{JA}$  is the sum of the thermal impedance from junction to lead  $R_{jL}$  and lead to ambient.

D: The static characteristics in Figures 1 to 6,12,14 are obtained using 80  $\mu\text{s}$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

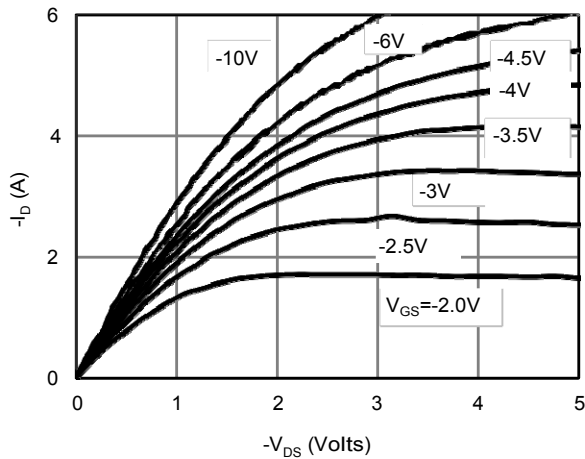


Fig 1: On-Region Characteristics

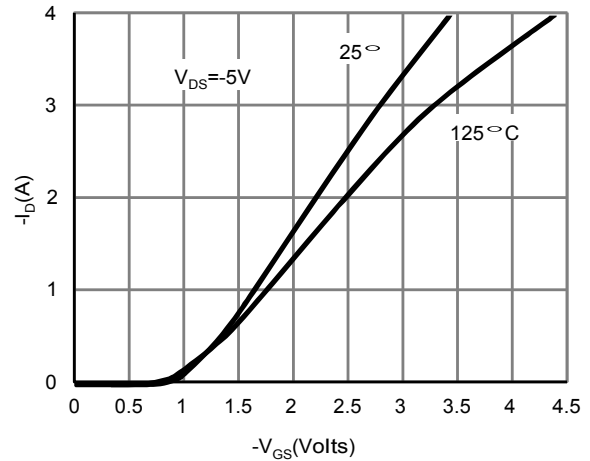


Figure 2: Transfer Characteristics

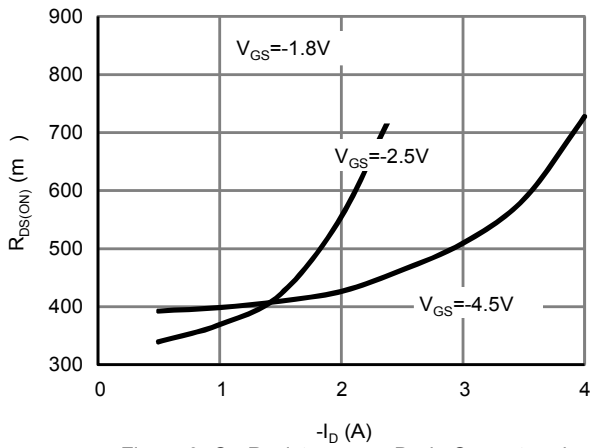


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

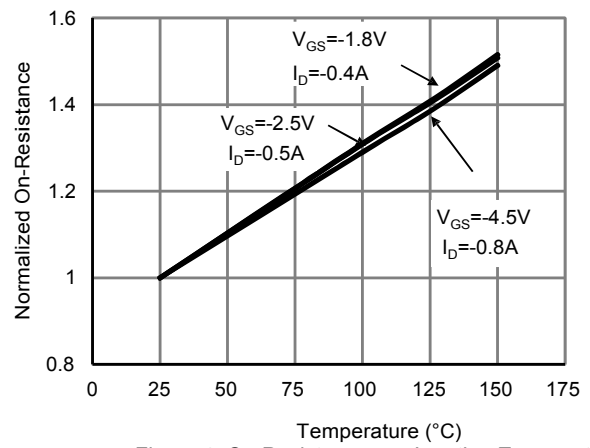


Figure 4: On-Resistance vs. Junction Temperature

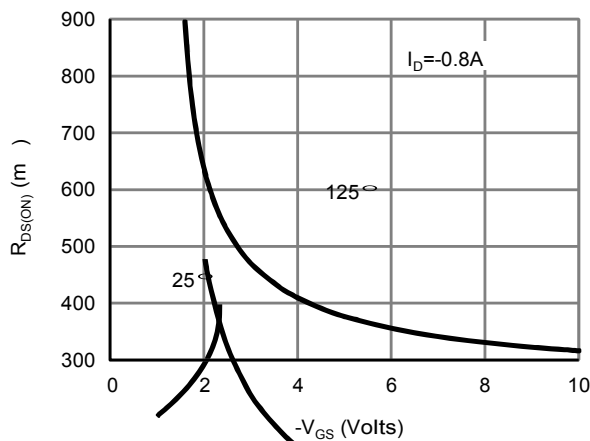


Figure 5: On-Resistance vs. Gate-Source Voltage

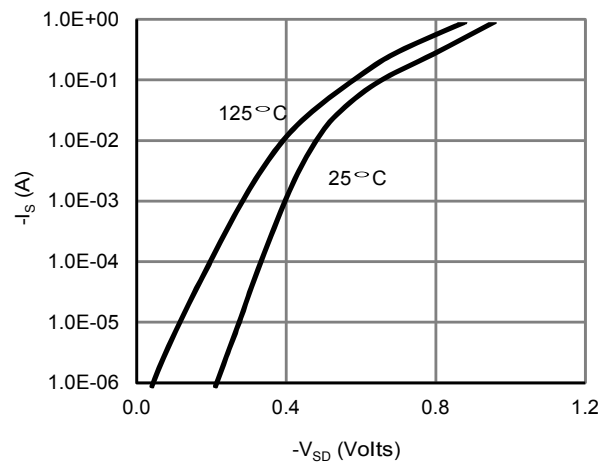


Figure 6: Body-Diode Characteristics

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

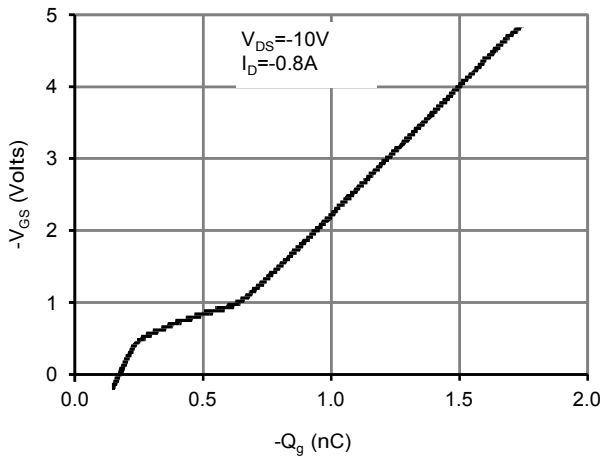


Figure 7: Gate-Charge Characteristics

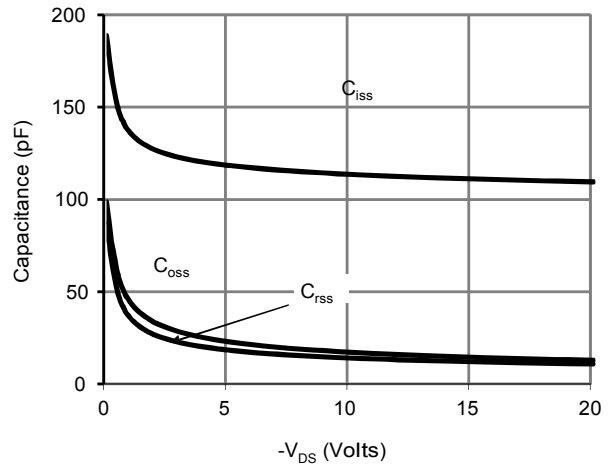


Figure 8: Capacitance Characteristics

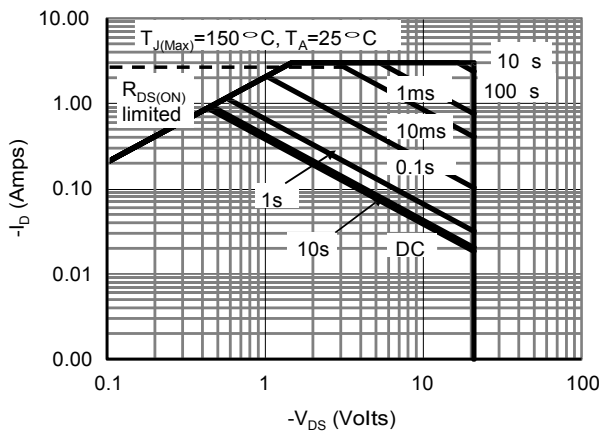


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

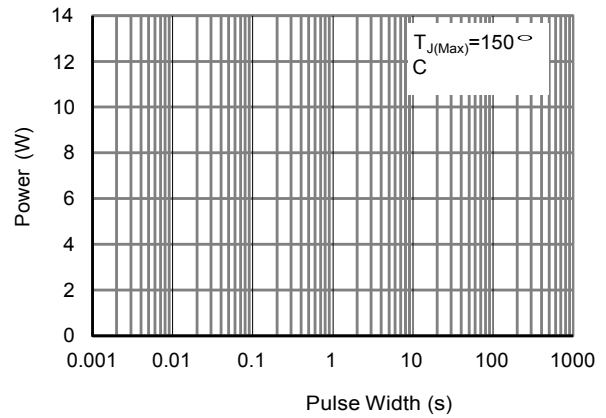


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

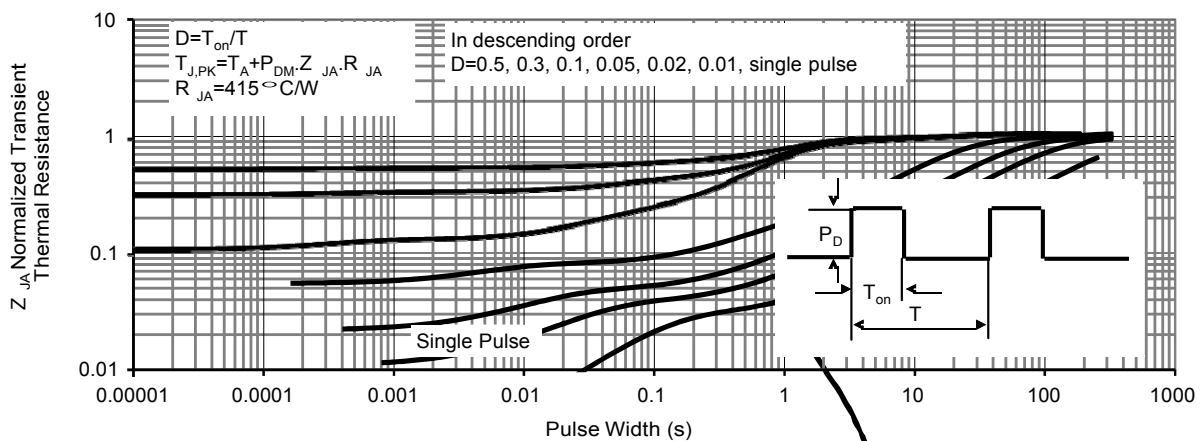
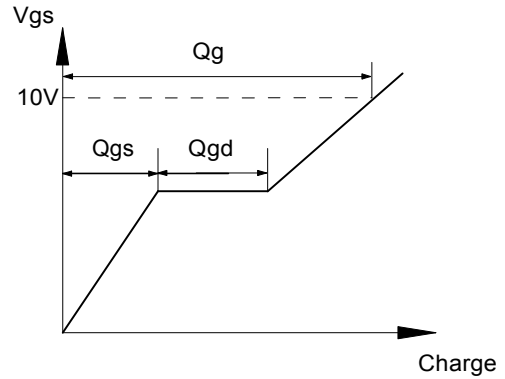
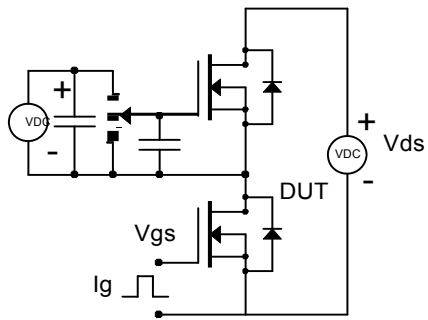
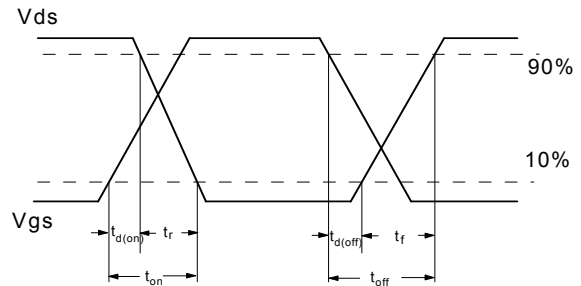
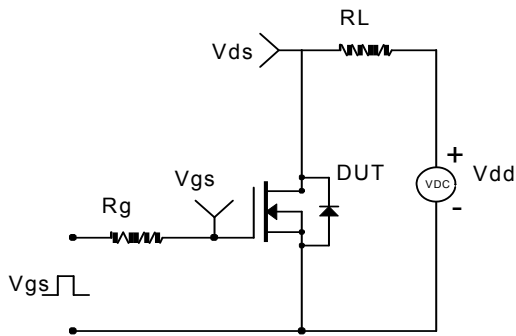


Figure 11: Normalized Maximum Transient Thermal Impedance

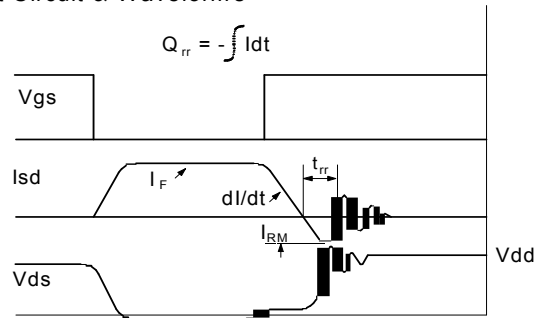
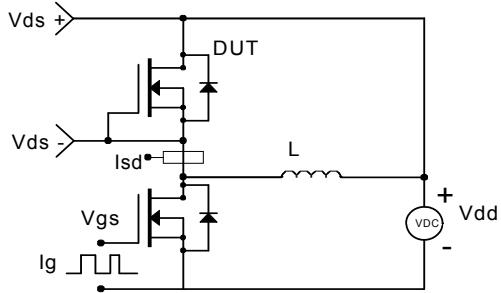
## Gate Charge Test Circuit & Waveform



## Resistive Switching Test Circuit & Waveforms



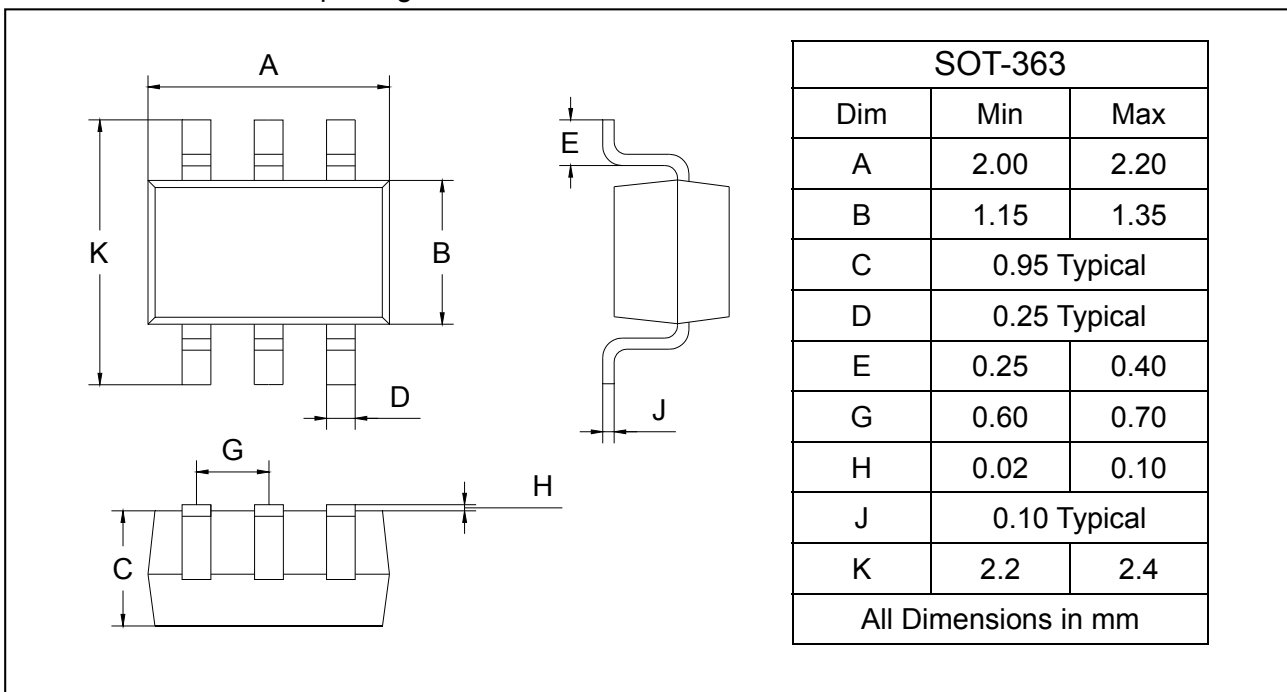
## Diode Recovery Test Circuit & Waveforms



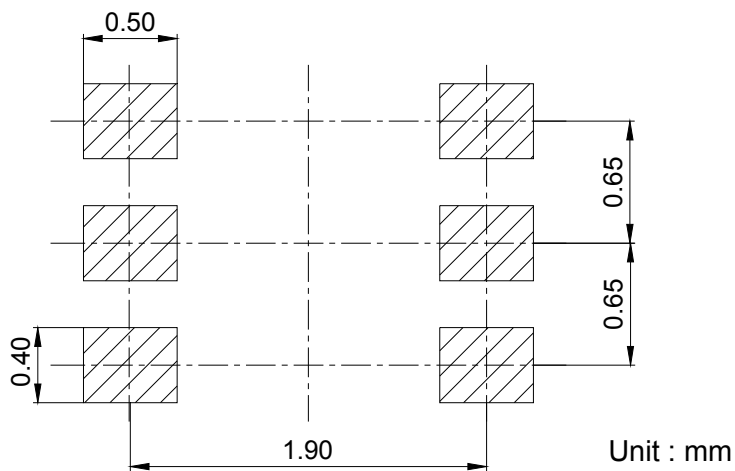
## PACKAGE OUTLINE

Plastic surface mounted package

SOT-363



## SOLDERING FOOTPRINT



## PACKAGE INFORMATION

Device	Package	Shipping
HM2301BWKR	SOT-363	3000/Tape&Reel