

**Pin Definition:**  
 1. Anode      6. Cathode  
 2. NC          5. Gate  
 3. Drain       4. Source  
 7. Cathode    8. Drain

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ)	I <sub>D</sub> (A)
-20	94 @ V <sub>GS</sub> = -4.5V	-2.8
	131 @ V <sub>GS</sub> = -2.5V	-2.3
	185 @ V <sub>GS</sub> = -1.8V	-0.54

### SCHOTTKY PRODUCT SUMMARY

V <sub>R</sub> (V)	V <sub>F</sub> (V)	I <sub>F</sub> (A)
20	0.5	2

### Features

- Configuration with MOSFET and Low Vf SKY
- Package low profile 0.75mm (Typ)
- Independent Pin Out for Design Flexibility

### Application

- Load Switch for Portable Applications
- DC-DC Buck Circuit
- Li-ion Battery Applications
- Cellular Charger Switch

### Ordering Information

Part No.	Package	Packing
TSM301K12CQ RFG	TDFN 2x2	3Kpcs / 7" Reel

**Note:** "G" denotes for Halogen Free

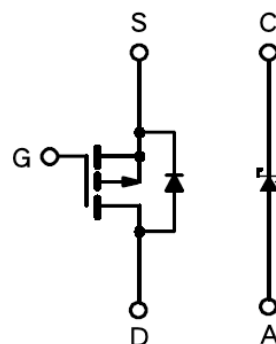
### MOSFET Absolute Maximum Rating (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	-20	V
Gate-Source Voltage	V <sub>GS</sub>	±12	V
Continuous Drain Current (Note 1,2)	I <sub>D</sub>	-4.5	A
Pulsed Drain Current	I <sub>DM</sub>	-8	A
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25 °C	6.5 W
		T <sub>A</sub> =25 °C (Note 2)	1.56 W
Operating Junction Temperature	T <sub>J</sub>	+150	°C
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	- 55 to +150	°C

### Schottky Absolute Maximum Rating (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Reverse Voltage	V <sub>R</sub>	20	V
Average Forward Current (Note 1,2)	I <sub>F</sub>	2	A
Pulsed Forward Current	I <sub>FM</sub>	5	A
Maximum Power Dissipation (Note 1)	P <sub>D</sub>	T <sub>C</sub> =25 °C	6.8 W
		T <sub>A</sub> =25 °C (Note 2)	1.47 W

### Block Diagram



P-Channel MOSFET with Schottky Diode

### Thermal Resistance Ratings

Parameter	Symbol	Limit	Unit	
<b>MOSFET</b>				
Thermal Resistance-Junction to Ambient	$R\theta_{JA}$	$T \leq 5s$	80	$^{\circ}C/W$
		Steady State	120	$^{\circ}C/W$
<b>Schottky</b>				
Thermal Resistance-Junction to Ambient	$R\theta_{JA}$	$T \leq 5s$	85	$^{\circ}C/W$
		Steady State	130	$^{\circ}C/W$

#### Notes:

1. Surface mounted on 1" x 1" (2 oz) FAR4 board,
2.  $t \leq 5s$

### MOSFET Electrical Specifications (Ta = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = -250\mu A$	$BV_{DSS}$	-20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	$V_{GS(TH)}$	-0.5	--	--	V
Gate Body Leakage	$V_{GS} = \pm 12V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = -20V, V_{GS} = 0V$	$I_{DSS}$	--	--	-1	$\mu A$
Drain-Source On-State Resistance <sup>a</sup>	$V_{GS} = -4.5V, I_D = -2.8A$	$R_{DS(ON)}$	--	--	94	m $\Omega$
	$V_{GS} = -2.5V, I_D = -2.3A$		--	--	131	
	$V_{GS} = -1.8V, I_D = -0.54A$		--	--	185	
Diode Forward Voltage	$I_S = -1.6A, V_{GS} = 0V$	$V_{SD}$	--	--	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$V_{DS} = -6V, I_D = -2.8A, V_{GS} = -5V$	$Q_g$	--	5.2	10	nC
Gate-Source Charge		$Q_{gs}$	--	1.36	--	
Gate-Drain Charge		$Q_{gd}$	--	0.6	--	
Input Capacitance	$V_{GS} = 0V, V_{DS} = -6V, f = 1.0MHz$	$C_{iss}$	--	5.2	--	pF
Output Capacitance		$C_{oss}$	--	9.7	--	
Reverse Transfer Capacitance		$C_{rss}$	--	19	--	
<b>Switching<sup>c</sup></b>						
Turn-On Delay Time	$V_{DS} = -15V, R_D = 15\Omega, R_G = 6\Omega, V_{GS} = -10V$	$t_{d(on)}$	--	29	--	nS
Turn-On Rise Time		$t_r$	--	295	--	
Turn-Off Delay Time		$t_{d(off)}$	--	170	--	
Turn-Off Fall Time		$t_f$	--	65	--	

### Schottky Electrical Specifications (Ta = 25°C unless otherwise noted)

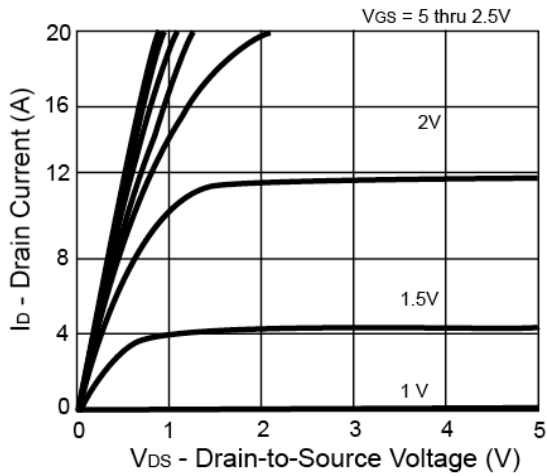
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Forward Voltage Drop	$I_F = 1A$	$V_F$	--	--	0.5	V
Maximum Reverse Leakage Current	$V_R = 5V$	$I_{Rm}$	--	0.015	0.08	mA
	$V_R = 20V$		--	0.02	0.10	
Junction Capacitance	$V_R = 10V$	$C_T$	--	60	--	pF

#### Notes:

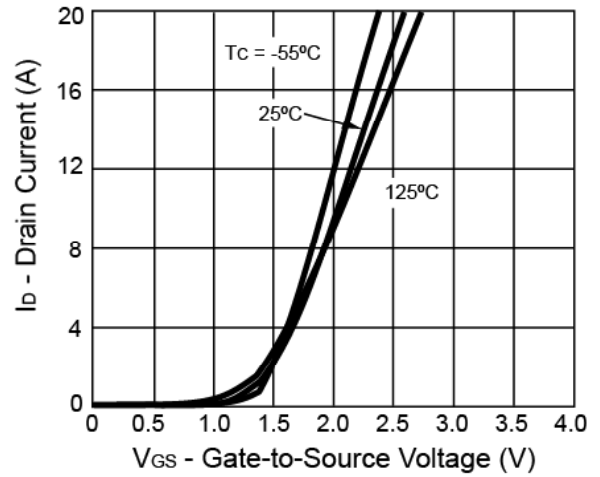
- a. pulse test:  $PW \leq 300\mu S$ , duty cycle  $\leq 2\%$
- b. For DESIGN AID ONLY, not subject to production testing.
- c. Switching time is essentially independent of operating temperature.

**MOSFET Electrical Characteristics Curve** (Ta = 25°C, unless otherwise noted)

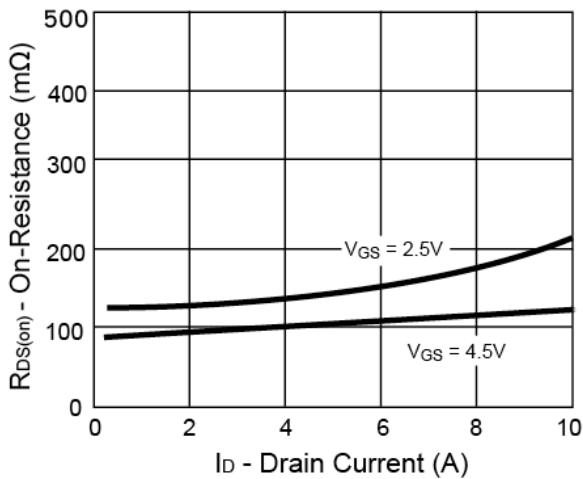
**Output Characteristics**



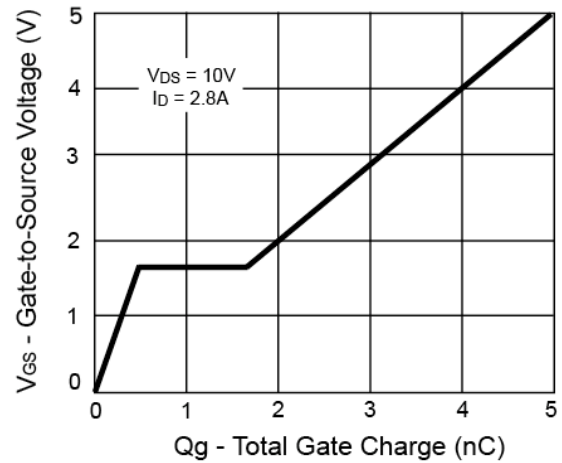
**Transfer Characteristics**



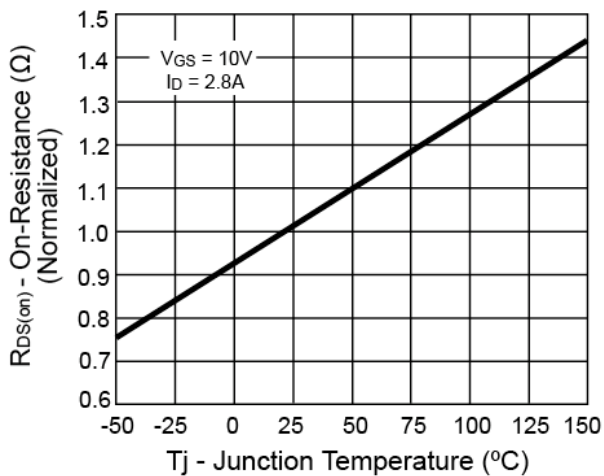
**On-Resistance vs. Drain Current**



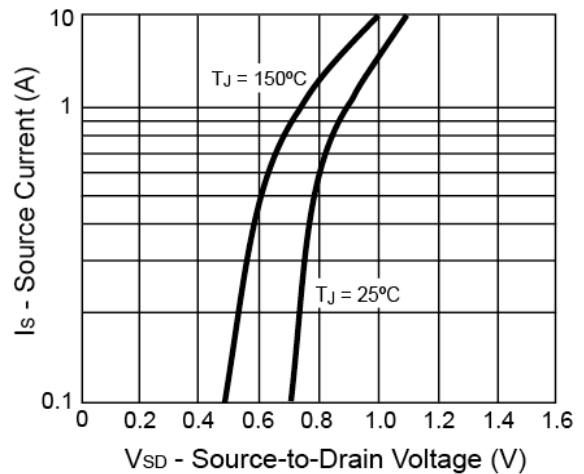
**Gate Charge**



**On-Resistance vs. Junction Temperature**

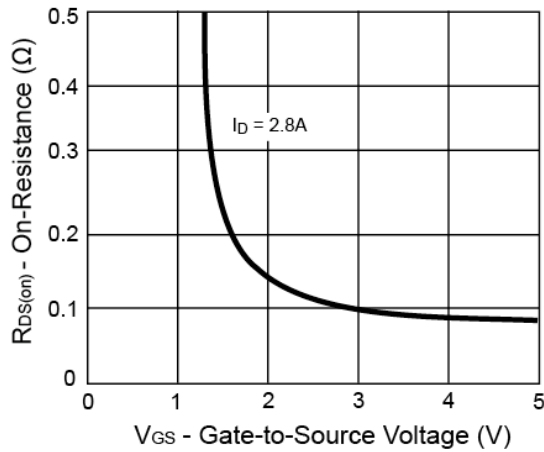


**Source-Drain Diode Forward Voltage**

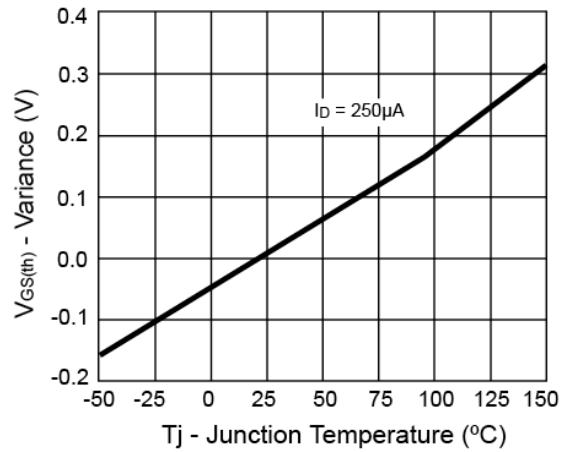


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

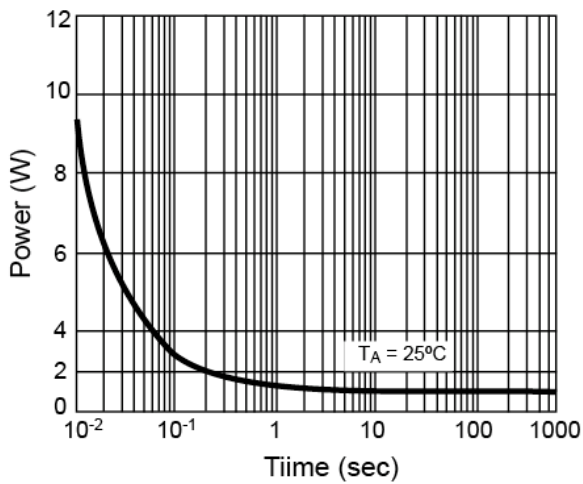
**On-Resistance vs. Gate-Source Voltage**



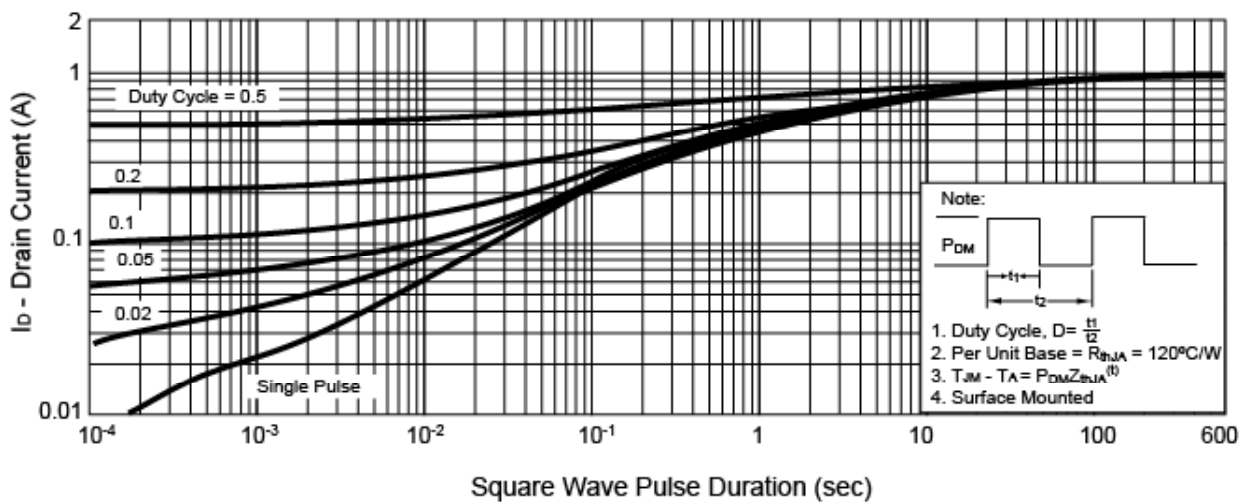
**Threshold Voltage**



**Single Pulse Power**

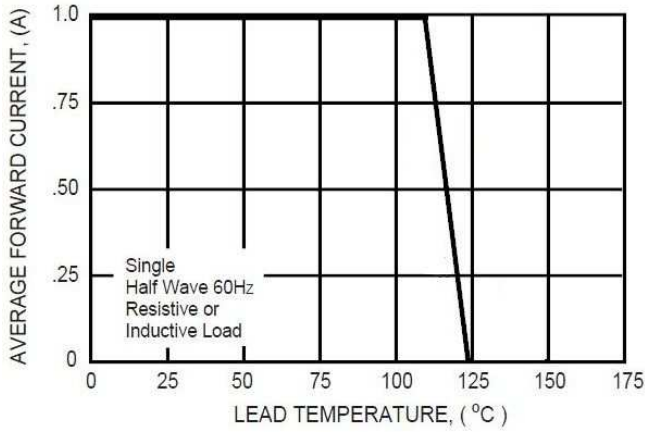


**Normalized Thermal Transient Impedance, Junction-to-Ambient**

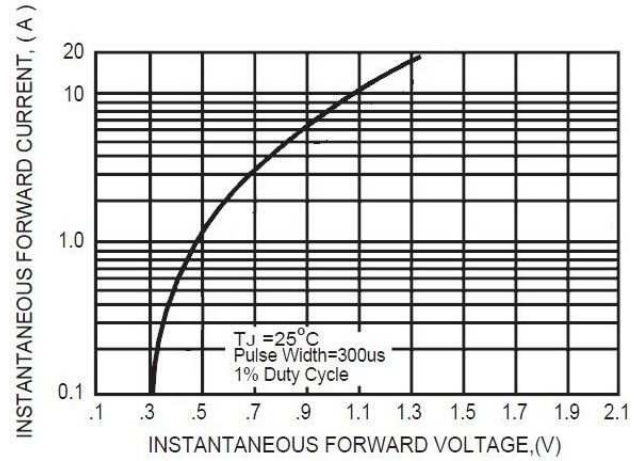


### SCHOTTKY Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

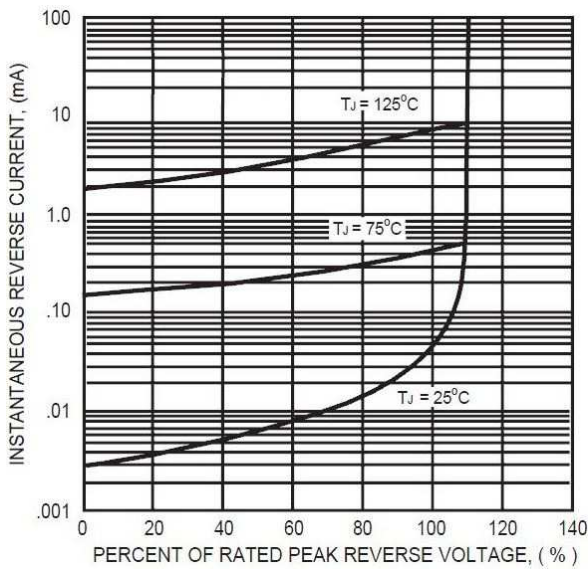
**Typical Forward Current Derating Curve**



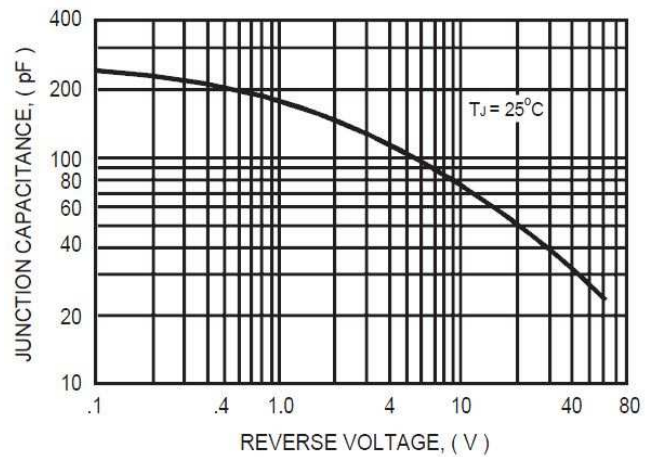
**Typical Instantaneous Forward Characteristics**



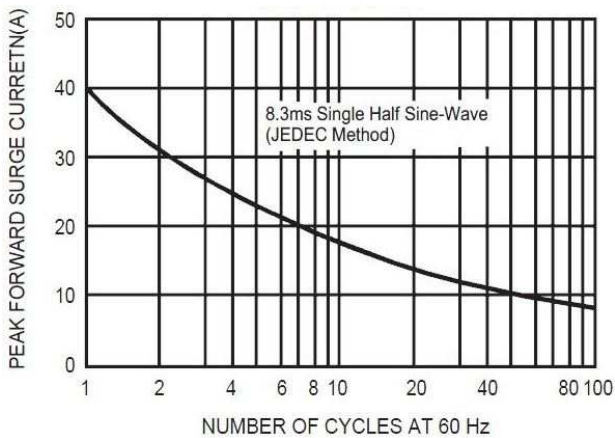
**Typical Reverse Characteristics**



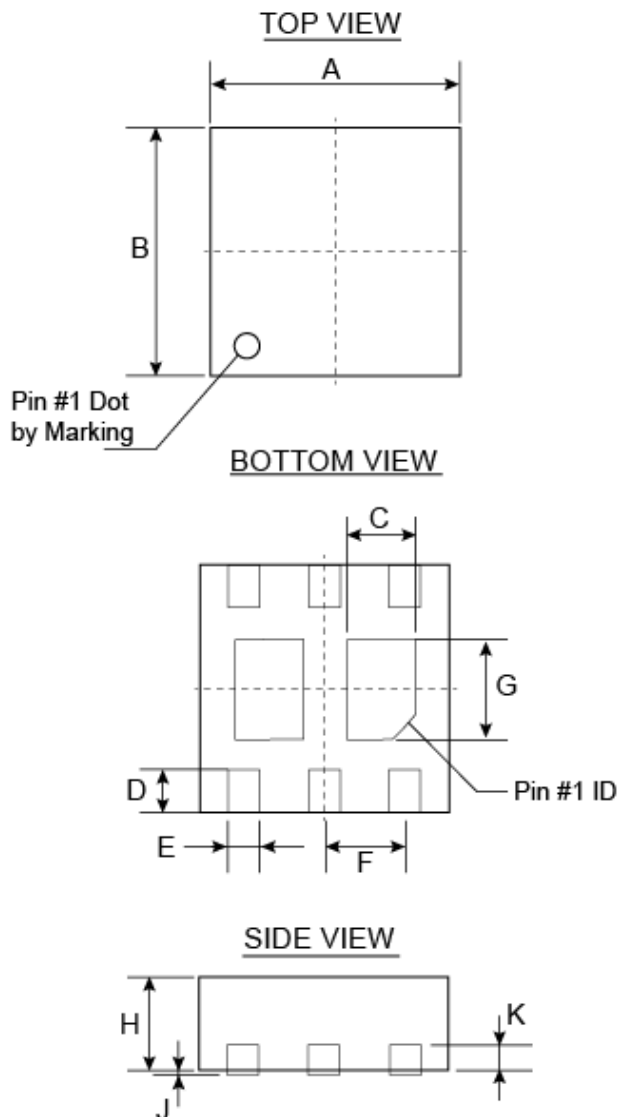
**Typical Junction Capacitance**



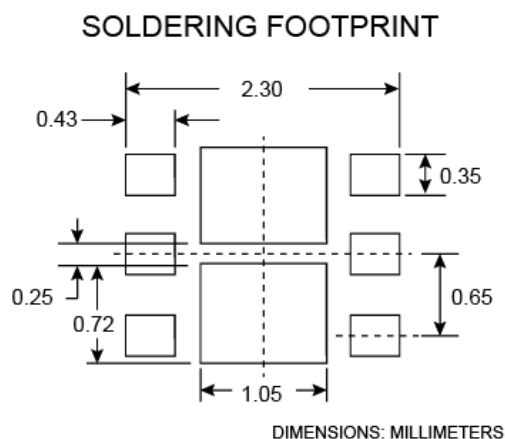
**Maximum Repetitive Forward Surge Current**



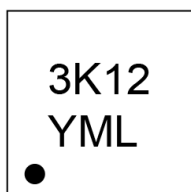
### TDFN 2x2 Mechanical Drawing



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.95	2.05	0.0768	0.0807
B	1.95	2.05	0.0768	0.0807
C	0.50	0.60	0.0197	0.0236
D	0.30	0.40	0.0118	0.0157
E	0.20	0.30	0.0079	0.0118
F	0.65 BSC		0.0256 BSC	
G	0.75	0.85	0.0295	0.0335
H	0.70	0.80	0.0276	0.0315
J	--	0.05	-	0.0020
K	0.195	0.211	0.0077	0.0083



### Marking Diagram



- Y** = Year Code
- M** = Month Code for Halogen Free Product  
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code

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