



**Pin Definition:**

1. Drain 1	8. Drain 2
2. Source 1	7. Source 2
3. Source 1	6. Source 2
4. Gate 1	5. Gate 2

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
-20	30 @ $V_{GS} = -4.5V$	-4.5
	42 @ $V_{GS} = -2.5V$	-3
	68 @ $V_{GS} = -1.8V$	-2

### Features

- Advance Trench Process Technology
- High Density Cell Design for Ultra Low On-resistance

### Application

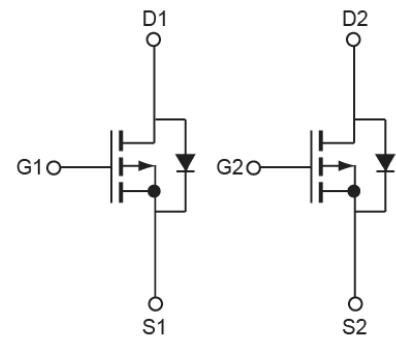
- Load Switch
- PA Switch

### Ordering Information

Part No.	Package	Packing
TSM6963SDCA RV	TSSOP-8	3Kpcs / 13" Reel
TSM6963SDCA RVG	TSSOP-8	3Kpcs / 13" Reel

Note: "G" denote for Halogen Free Product

### Block Diagram



Dual P-Channel MOSFET

### Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current, $V_{GS}$ @4.5V.	$I_D$	-4.5	A
Pulsed Drain Current, $V_{GS}$ @4.5V	$I_{DM}$	-16	A
Continuous Source Current (Diode Conduction) <sup>a,b</sup>	$I_S$	-1.0	A
Maximum Power Dissipation	$P_D$	Ta = 25°C	1.14
		Ta = 70°C	0.73
Operating Junction Temperature	$T_J$	+150	°C
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to +150	°C

### Thermal Performance

Parameter	Symbol	Limit	Unit
Junction to Foot (Drain) Thermal Resistance	$R_{\theta_{JF}}$	75	°C/W
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta_{JA}}$	90	°C/W

### Notes:

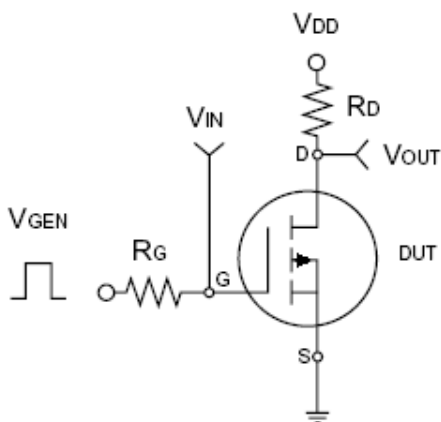
- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

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

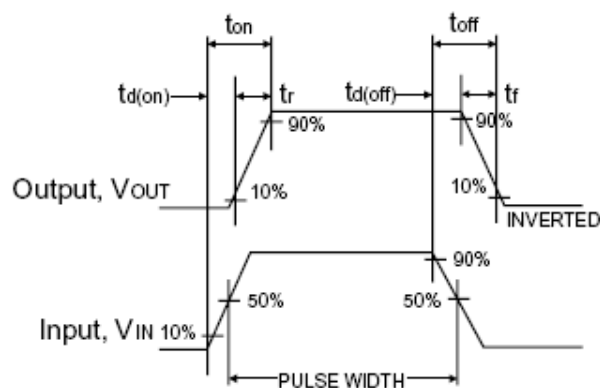
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = -250\mu A$	$BV_{DSS}$	-20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	$V_{GS(TH)}$	-0.5	-0.7	-1.0	V
Zero Gate Voltage Drain Current	$V_{DS} = -16V, V_{GS} = 0V$	$I_{DSS}$	--	--	-1	$\mu A$
Gate Body Leakage	$V_{GS} = \pm 12V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
On-State Drain Current	$V_{DS} = -5V, V_{GS} = -4.5V$	$I_{D(ON)}$	-25	--	--	A
Drain-Source On-State Resistance	$V_{GS} = -4.5V, I_D = -4.5A$	$R_{DS(ON)}$	--	23	30	m $\Omega$
	$V_{GS} = -2.5V, I_D = -3A$		--	30	42	
	$V_{GS} = -1.8V, I_D = -2A$		--	45	68	
Forward Transconductance	$V_{DS} = -5V, I_D = -4.5A$	$g_{fs}$	--	16	--	S
Diode Forward Voltage	$I_S = -0.5A, V_{GS} = 0V$	$V_{SD}$	--	-0.8	-1.3	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$V_{DS} = -10V, I_D = -4.5A, V_{GS} = -4.5V$	$Q_g$	--	14	20	nC
Gate-Source Charge		$Q_{gs}$	--	2.1	10	
Gate-Drain Charge		$Q_{gd}$	--	4.7	--	
Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz$	$C_{iss}$	--	1500	--	pF
Output Capacitance		$C_{oss}$	--	220	--	
Reverse Transfer Capacitance		$C_{rss}$	--	160	--	
<b>Switching<sup>b,c</sup></b>						
Turn-On Delay Time	$V_{DD} = -10V, R_L = 10\Omega, I_D = -1A, V_{GEN} = -4.5V, R_G = 6\Omega$	$t_{d(on)}$	--	6	11	nS
Turn-On Rise Time		$t_r$	--	13	23	
Turn-Off Delay Time		$t_{d(off)}$	--	86	145	
Turn-Off Fall Time		$t_f$	--	42	70	

#### 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.



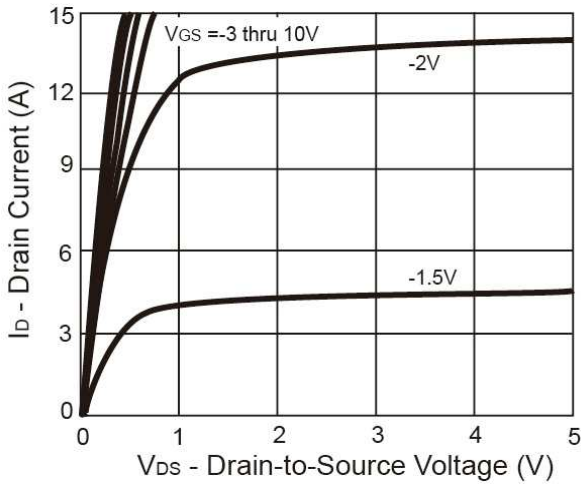
Switching Test Circuit



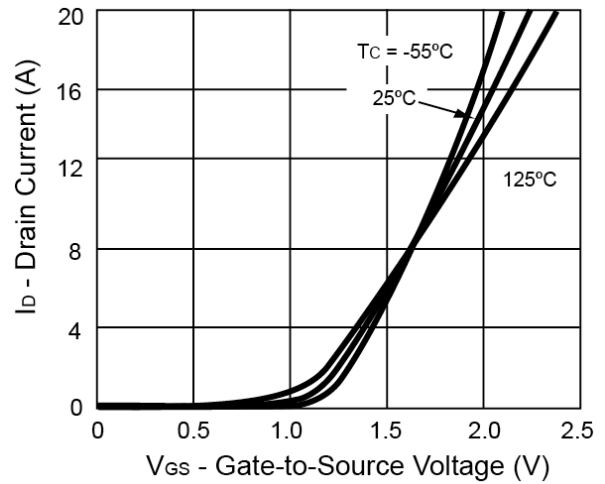
Switchin Waveforms

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

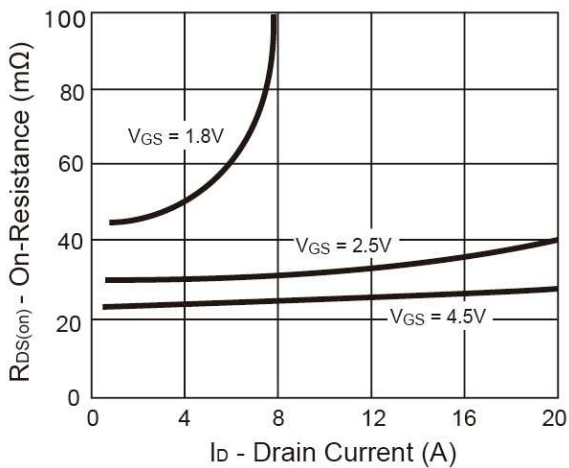
**Output Characteristics**



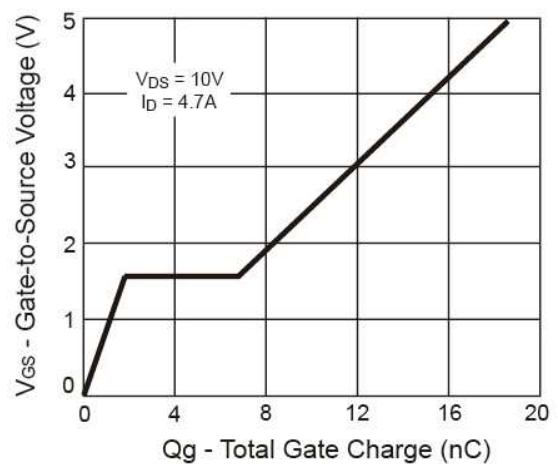
**Transfer Characteristics**



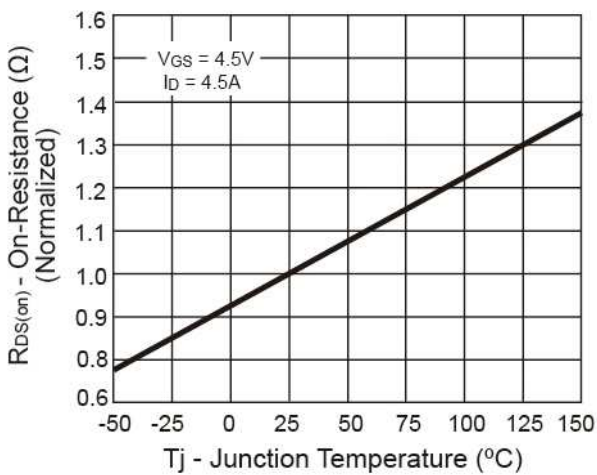
**On-Resistance vs. Drain Current**



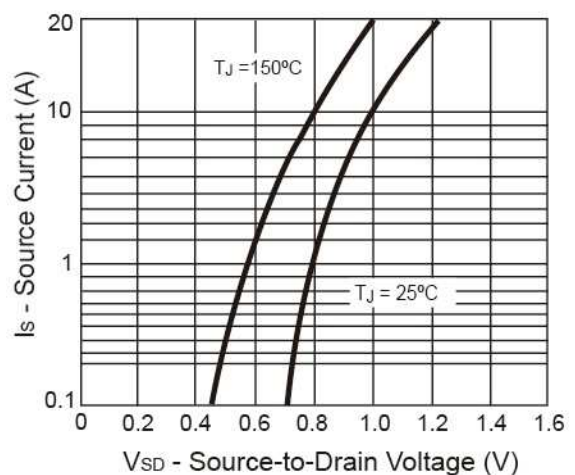
**Gate Charge**



**On-Resistance vs. Junction Temperature**

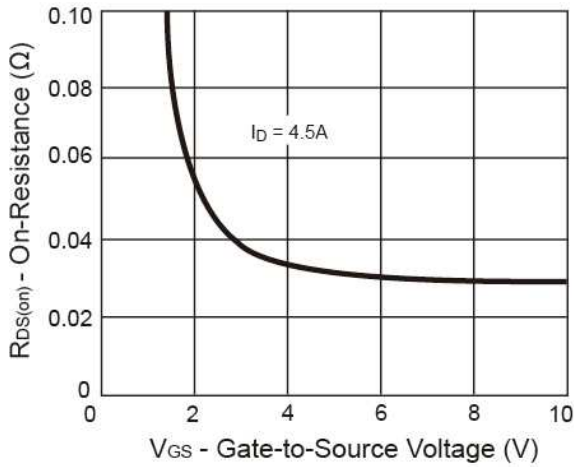


**Source-Drain Diode Forward Voltage**

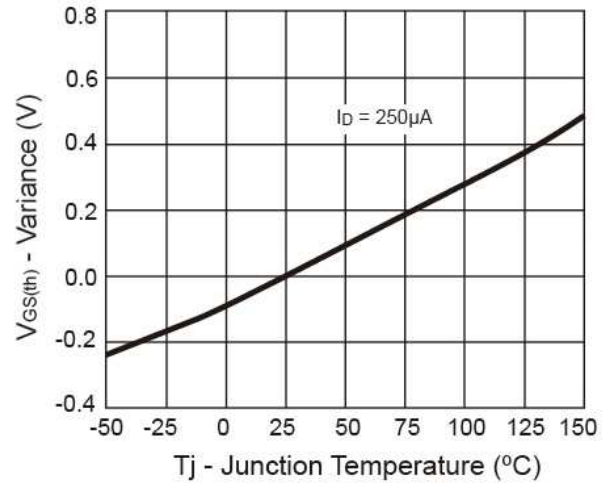


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

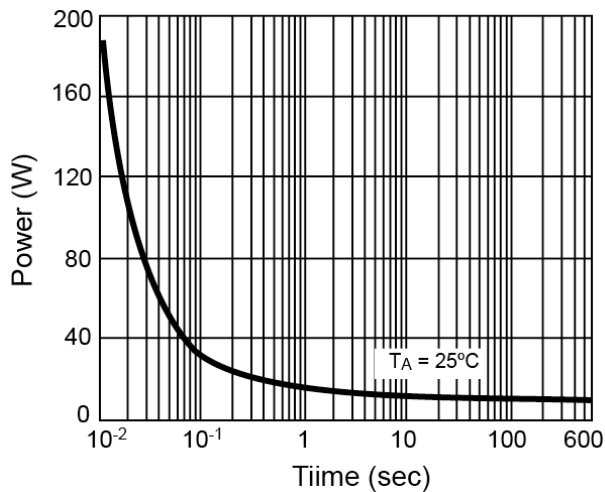
**On-Resistance vs. Gate-Source Voltage**



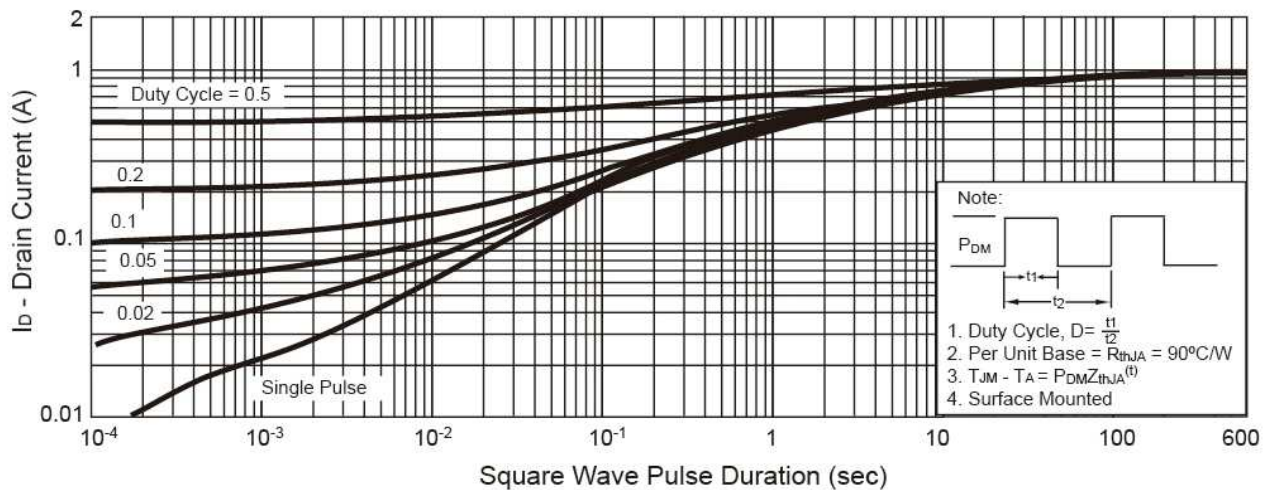
**Threshold Voltage**



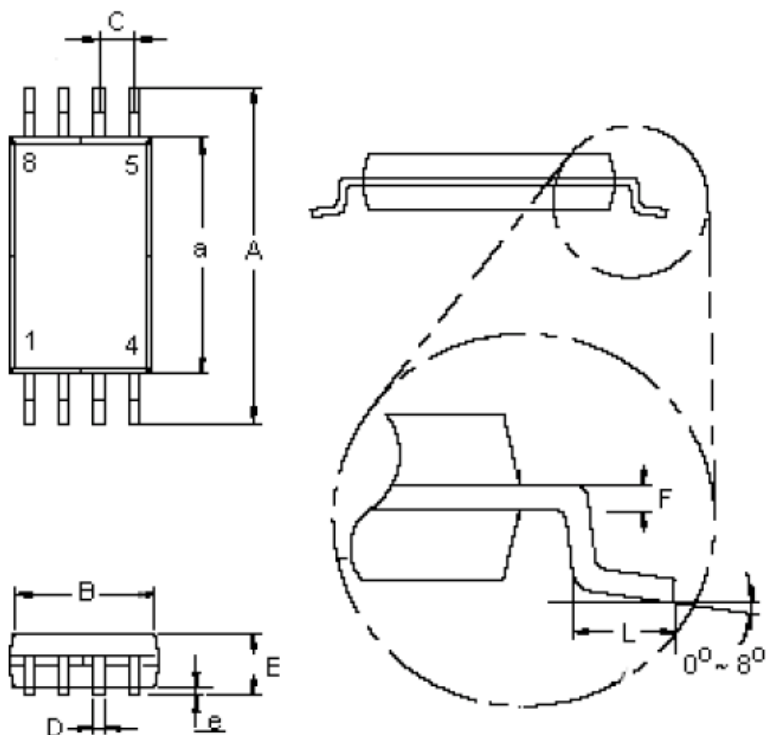
**Single Pulse Power**



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



**TSSOP-8 Mechanical Drawing**



TSSOP-8 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.20	6.60	0.244	0.260
a	4.30	4.50	0.170	0.177
B	2.90	3.10	0.114	0.122
C	0.65 (typ)		0.025 (typ)	
D	0.25	0.30	0.010	0.019
E	1.05	1.20	0.041	0.049
e	0.05	0.15	0.002	0.009
F	0.127		0.005	
L	0.50	0.70	0.020	0.028

**Marking Diagram**



- Y** = Year Code
- M** = Month Code  
 (A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)  
 = 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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