



# TSM6968D

20V Dual N-Channel MOSFET w/ESD Protected

TSSOP-8



Pin assignment:

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

$V_{DS} = 20V$

$R_{DS(on)}, V_{GS} @ 4.5V, I_{DS} @ 6.5A = 22m\Omega$

$R_{DS(on)}, V_{GS} @ 2.5V, I_{DS} @ 5.5A = 29m\Omega$

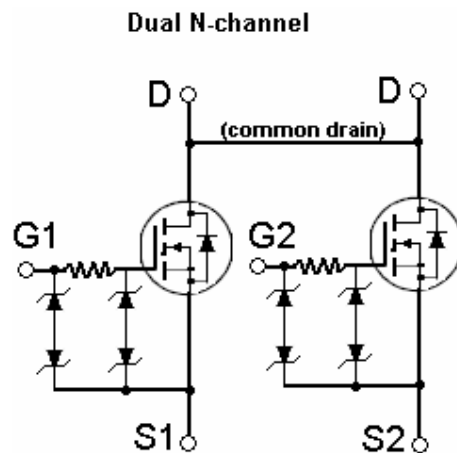
## Features

- ✧ Advanced trench process technology
- ✧ High density cell design for ultra low on-resistance
- ✧ Excellent thermal and electrical capabilities
- ✧ Specially designed for Li-ion battery packs.
- ✧ Battery switch application

## Ordering Information

Part No.	Packing	Package
TSM6968DCA	Tape & Reel 3,000/per reel	TSSOP-8

## Block Diagram



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

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	20V	V	
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V	
Continuous Drain Current, $V_{GS} @ 4.5V$ .	$I_D$	6.5	A	
Pulsed Drain Current, $V_{GS} @ 4.5V$	$I_{DM}$	30	A	
Maximum Power Dissipation	$P_D$	Ta = 25°C	1.5	W
		Ta = 70°C	0.96	
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	$R_{\theta JF}$	35	°C/W
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta JA}$	83	°C/W

Note: Surface mounted on FR4 board  $t \leq 10sec$ .

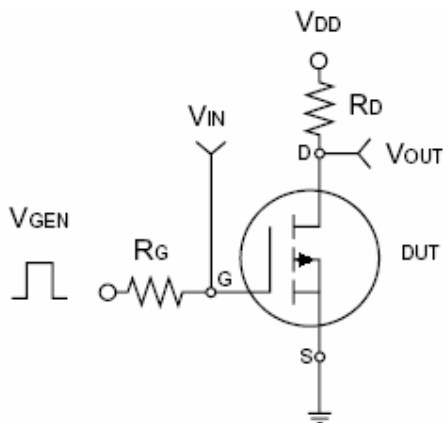


## Electrical Characteristics

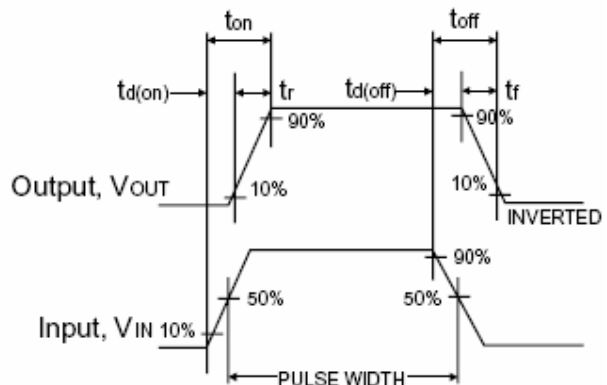
Rate  $I_D = 6.5A$ , ( $T_a = 25^\circ C$  unless otherwise noted)

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
Drain-Source On-State Resistance	$V_{GS} = 4.5V, I_D = 6.5A$	$R_{DS(ON)}$	--	15	22	m $\Omega$
Drain-Source On-State Resistance	$V_{GS} = 2.5V, I_D = 5.5A$	$R_{DS(ON)}$	--	20	30	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	0.5	0.85	--	V
Zero Gate Voltage Drain Current	$V_{DS} = 20V, V_{GS} = 0V$	$I_{DSS}$	--	--	1.0	$\mu A$
Gate Body Leakage	$V_{GS} = \pm 12V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 10$	$\mu A$
On-State Drain Current	$V_{GS} = 4.5V, V_{DS} \geq 5V$	$I_{D(ON)}$	30	--	--	A
Forward Transconductance	$V_{DS} = 10V, I_D = 6.5A$	$g_{fs}$	--	30	--	S
<b>Dynamic</b>						
Total Gate Charge	$V_{DS} = 10V, I_D = 6.5A,$ $V_{GS} = 4.5V$	$Q_g$	--	15.5	30	nC
Gate-Source Charge		$Q_{gs}$	--	2	--	
Gate-Drain Charge		$Q_{gd}$	--	3.5	--	
Turn-On Delay Time	$V_{DD} = 10V, R_L = 10\Omega,$ $I_D = 1A, V_{GEN} = 4.5V,$ $R_G = 6\Omega$	$t_{d(on)}$	--	75	100	nS
Turn-On Rise Time		$t_r$	--	125	150	
Turn-Off Delay Time		$t_{d(off)}$	--	600	720	
Turn-Off Fall Time		$t_f$	--	300	360	
Input Capacitance	$V_{DS} = 10V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	1336	--	pF
Output Capacitance		$C_{oss}$	--	220	--	
Reverse Transfer Capacitance		$C_{rss}$	--	130	--	
<b>Source-Drain Diode</b>						
Max. Diode Forward Current		$I_S$	--	--	1.5	A
Diode Forward Voltage	$I_S = 1.5A, V_{GS} = 0V$	$V_{SD}$	--	0.6	1.2	V

Note : pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$



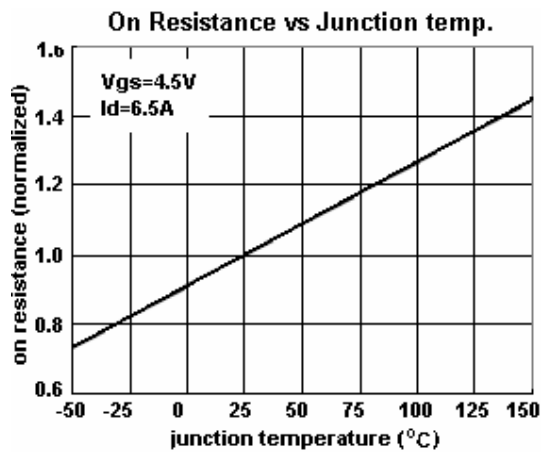
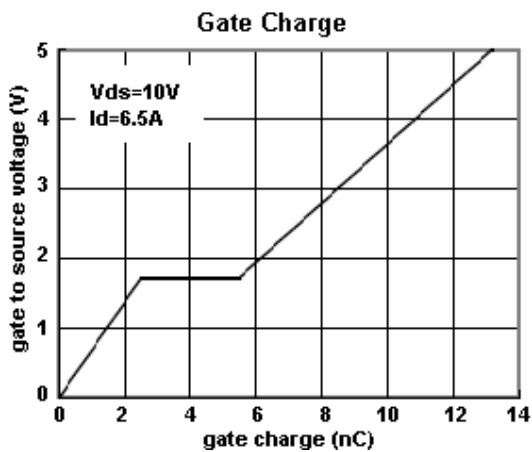
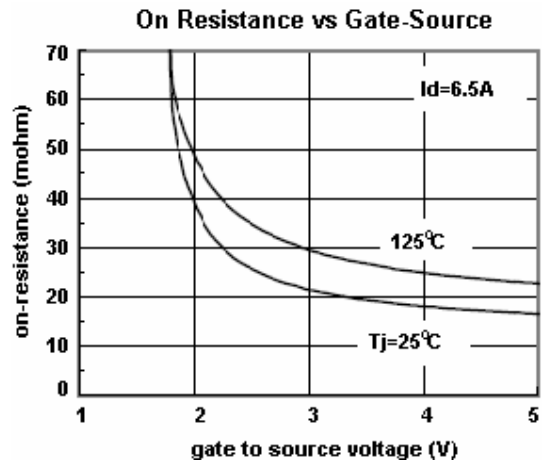
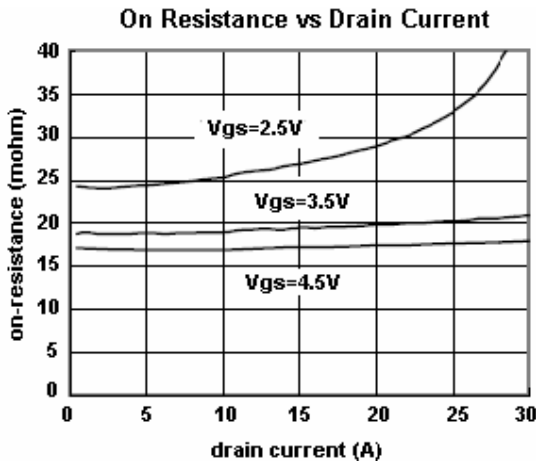
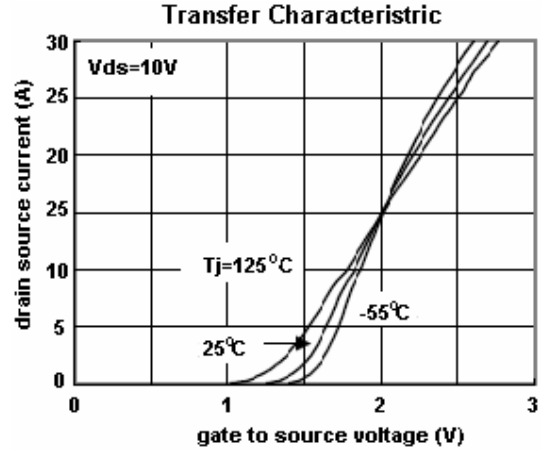
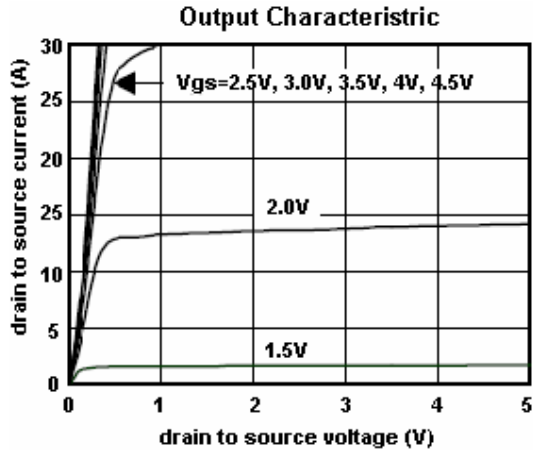
Switching Test Circuit



Switchin Waveforms

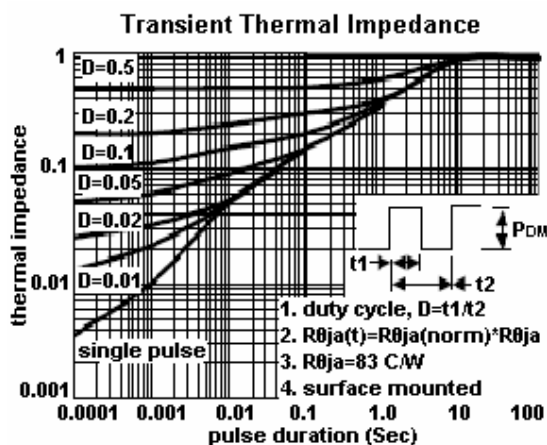
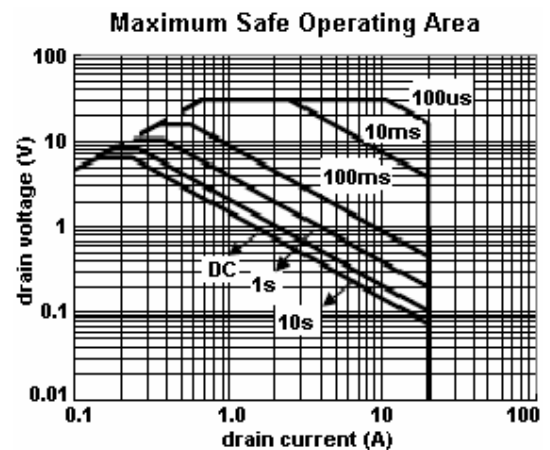
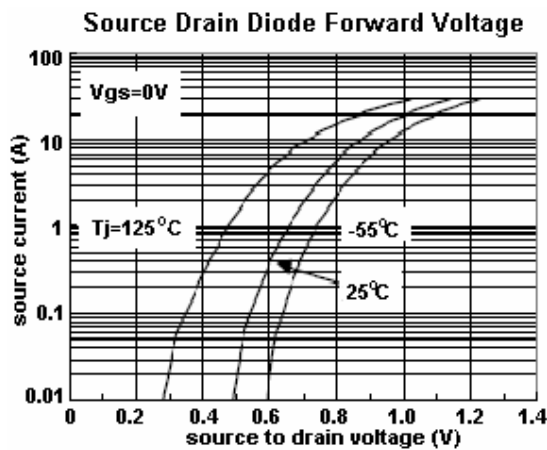
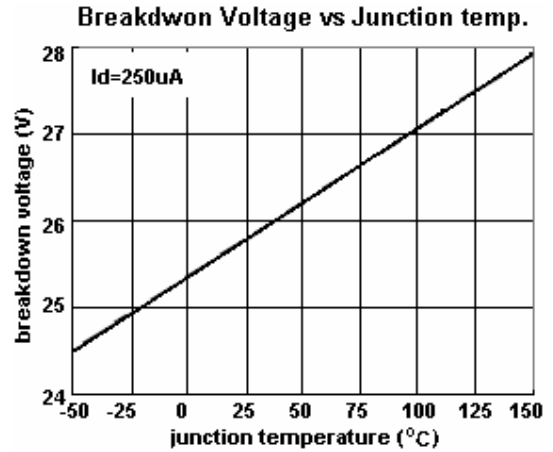
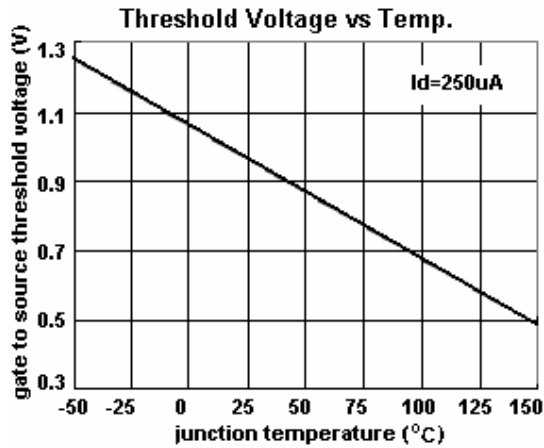


**Typical Characteristics Curve** ( $T_a = 25^\circ\text{C}$  unless otherwise noted)

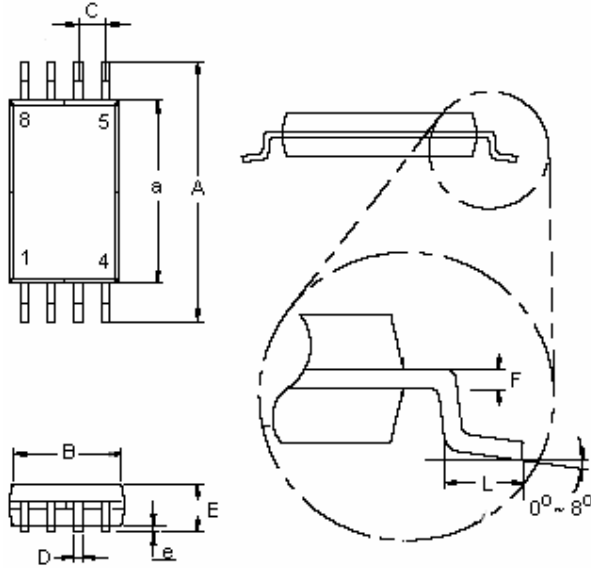




### Electrical Characteristics Curve (continued)



## 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

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