

### TO-252



#### Pin Definition:

1. Gate
2. Drain
3. Source

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
25	6 @ $V_{GS} = 10V$	30
	9 @ $V_{GS} = 4.5V$	30

### Features

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

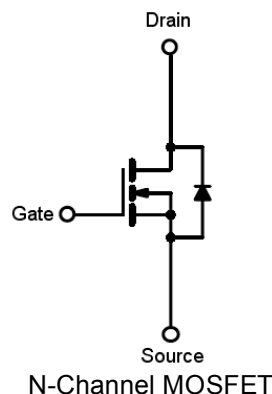
### Application

- Load Switch
- Dc-DC Converters and Motors Drivers

### Ordering Information

Part No.	Package	Packing
TSM55N03CP RO	TO-252	2.5Kpcs / 13" Reel

### Block Diagram



### Absolute Maximum Rating ( $T_a = 25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	25	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current, $V_{GS} @ 4.5V$ .	$I_D$	55	A
Pulsed Drain Current, $V_{GS} @ 4.5V$	$I_{DM}$	150	A
Continuous Source Current (Diode Conduction) <sup>a,b</sup>	$I_S$	20	A
Single Pulse Drain to Source Avalanche Energy ( $V_{DD} = 100V$ , $V_{GS}=10V$ , $I_{AS}=2A$ , $L=10mH$ , $R_G=25\Omega$ )	EAS	300	mJ
Maximum Power Dissipation	$P_D$	$T_a = 25^{\circ}C$	65
		$T_a = 70^{\circ}C$	42
Operating Junction Temperature	$T_J$	+150	$^{\circ}C$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^{\circ}C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Lead Temperature (1/8" from case)	$T_L$	10	S
Junction to Case Thermal Resistance	$R_{\theta JC}$	1.8	$^{\circ}C/W$
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta JA}$	40	$^{\circ}C/W$

#### Notes:

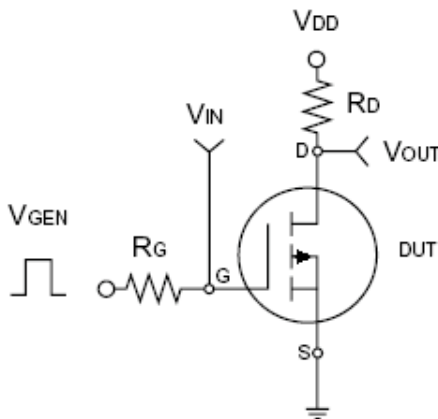
- a. Maximum DC current limited by the package
- b. Surface Mounted on 1" x 1" FR4 Board,  $t \leq 10$  sec.

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

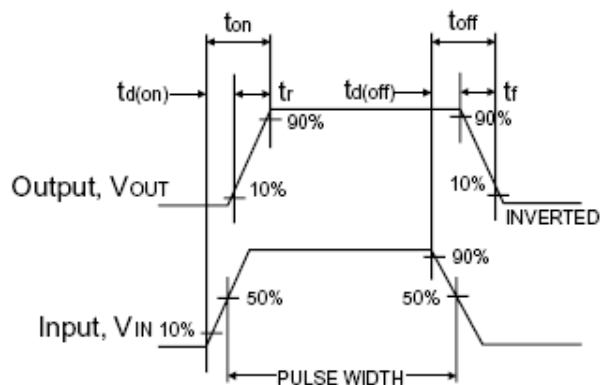
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	25	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1.0	1.9	3.0	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = 25V, V_{GS} = 0V$	$I_{DSS}$	--	--	1.0	$\mu A$
On-State Drain Current	$V_{DS} \geq 5V, V_{GS} = 10V$	$I_{D(ON)}$	55	--	--	A
Drain-Source On-State Resistance	$V_{GS} = 4.5V, I_D = 30A$	$R_{DS(ON)}$	--	7.5	9	m $\Omega$
	$V_{GS} = 10V, I_D = 30A$		--	4.5	6	
Forward Transconductance	$V_{DS} = 15V, I_D = 15A$	$g_{fs}$	--	55	--	S
Diode Forward Voltage	$I_S = 20A, V_{GS} = 0V$	$V_{SD}$	--	0.85	1.3	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$V_{DS} = 15V, I_D = 20A,$ $V_{GS} = 5V$	$Q_g$	--	26	--	nC
Gate-Source Charge		$Q_{gs}$	--	6	--	
Gate-Drain Charge		$Q_{gd}$	--	5	--	
Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	2325.9	--	pF
Output Capacitance		$C_{oss}$	--	330.55	--	
Reverse Transfer Capacitance		$C_{rss}$	--	173.91	--	
<b>Switching<sup>c</sup></b>						
Turn-On Delay Time	$V_{DD} = 15V, R_L = 15\Omega,$ $I_D = 1A, V_{GEN} = 10V,$ $R_G = 6\Omega$	$t_{d(on)}$	--	15.13	--	nS
Turn-On Rise Time		$t_r$	--	4	--	
Turn-Off Delay Time		$t_{d(off)}$	--	45.27	--	
Turn-Off Fall Time		$t_f$	--	7.6	--	

**Notes:**

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



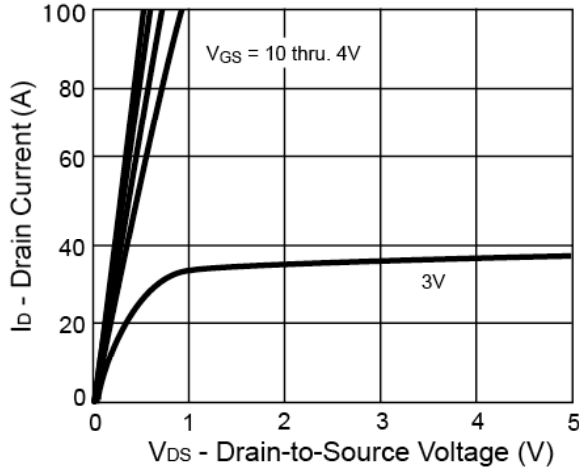
**Switching Test Circuit**



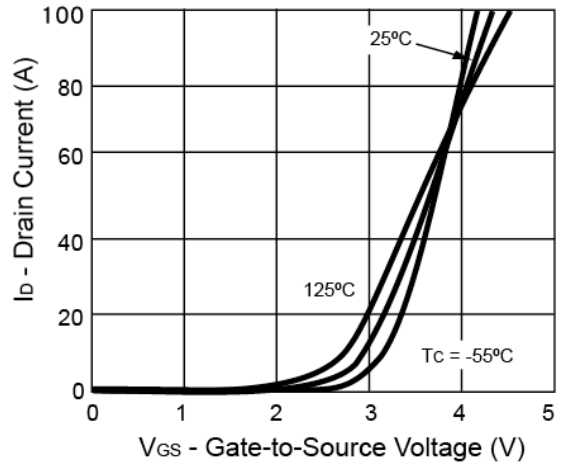
**Switchin Waveforms**

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

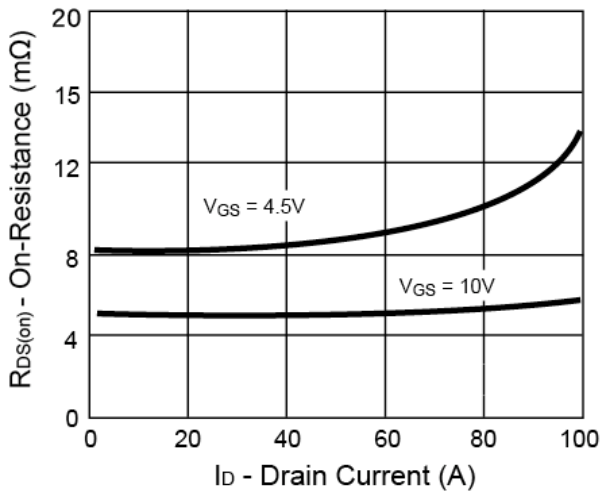
**Output Characteristics**



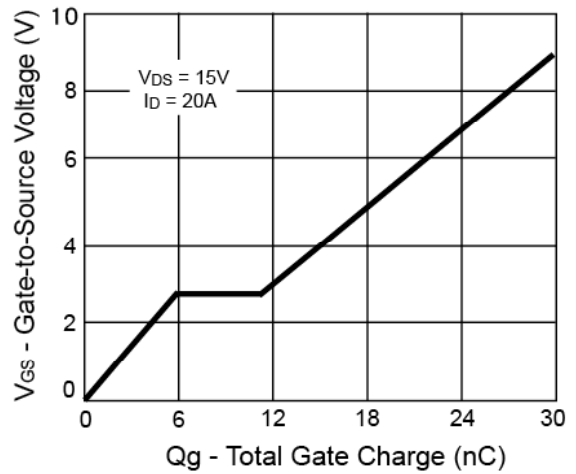
**Transfer Characteristics**



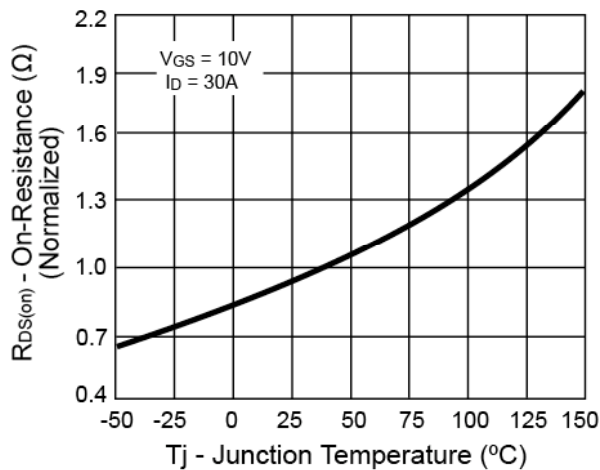
**On-Resistance vs. Drain Current**



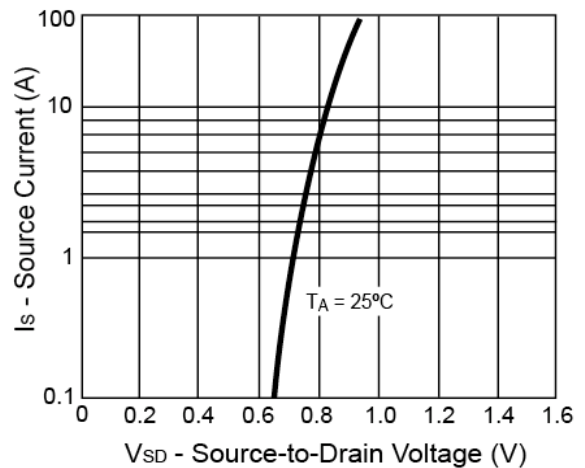
**Gate Charge**



**On-Resistance vs. Junction Temperature**

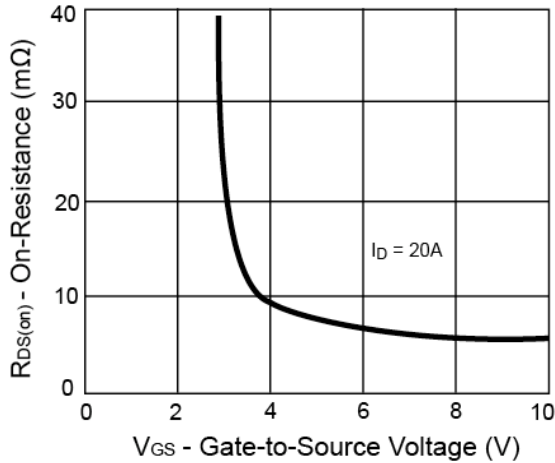


**Source-Drain Diode Forward Voltage**

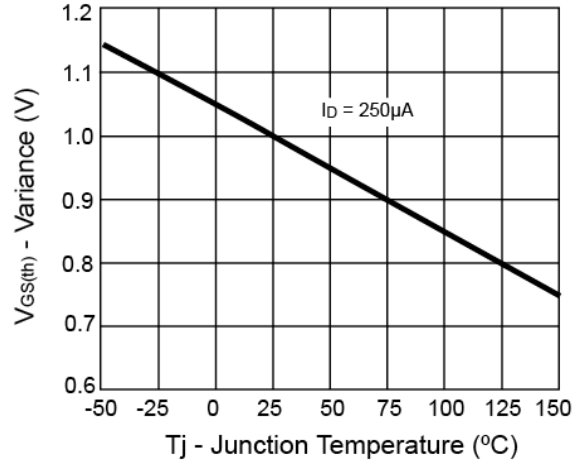


**Electrical Characteristics Curve** (Ta = 25°C, unless otherwise noted)

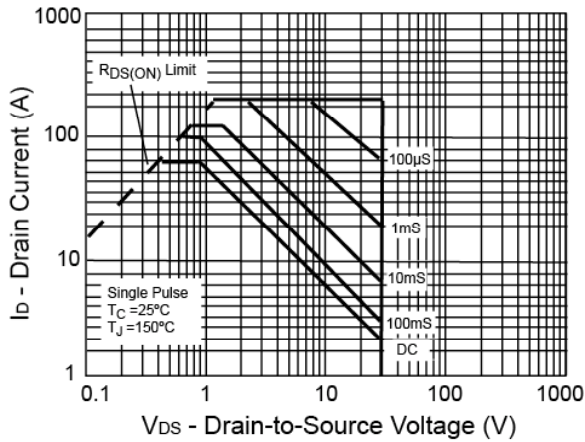
**On-Resistance vs. Gate-Source Voltage**



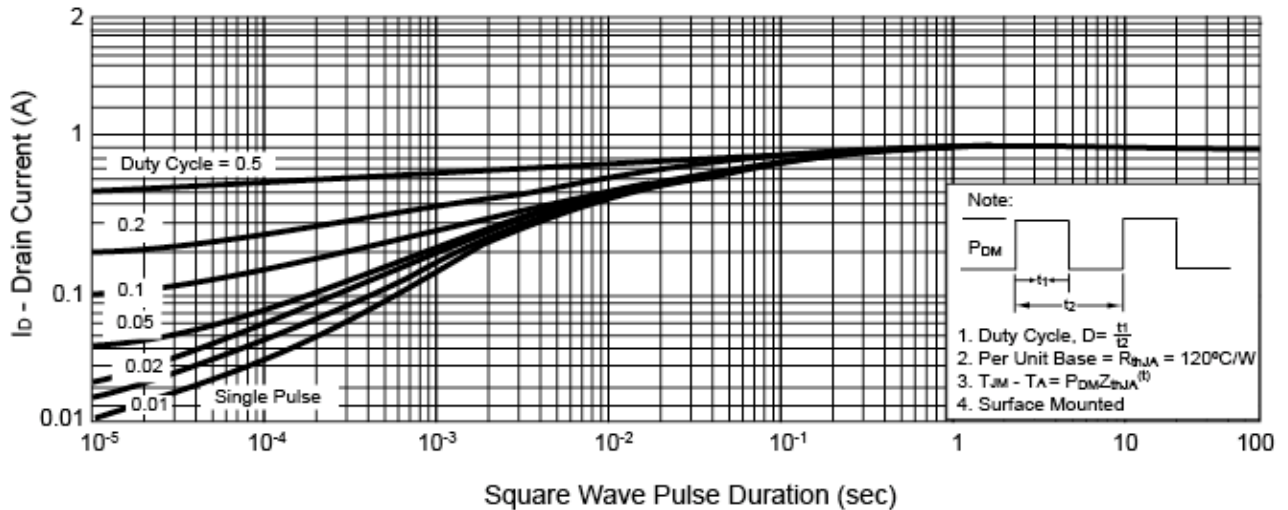
**Threshold Voltage**



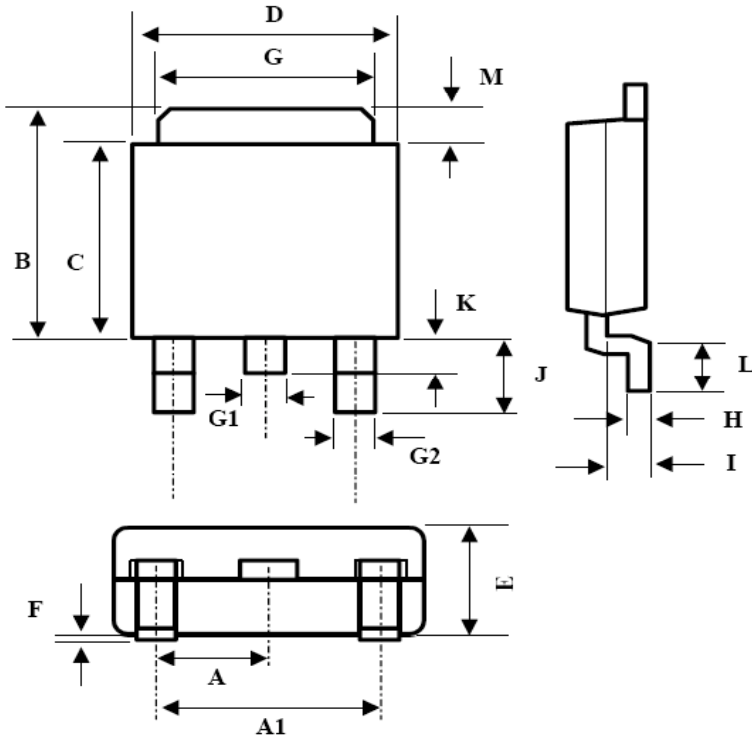
**Maximum Safe Operating Area**



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

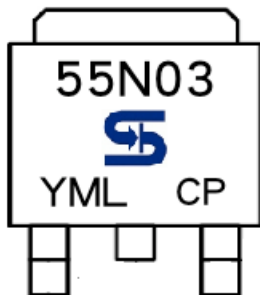


**SOT-252 Mechanical Drawing**



TO-252 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.3BSC		0.09BSC	
A1	4.6BSC		0.18BSC	
B	6.80	7.20	0.268	0.283
C	5.40	5.60	0.213	0.220
D	6.40	6.65	0.252	0.262
E	2.20	2.40	0.087	0.094
F	0.00	0.20	0.000	0.008
G	5.20	5.40	0.205	0.213
G1	0.75	0.85	0.030	0.033
G2	0.55	0.65	0.022	0.026
H	0.35	0.65	0.014	0.026
I	0.90	1.50	0.035	0.059
J	2.20	2.80	0.087	0.110
K	0.50	1.10	0.020	0.043
L	0.90	1.50	0.035	0.059
M	1.30	1.70	0.051	0.67

**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)
- L = Lot Code

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