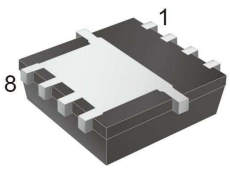
TSM020N03PQ56

30V N-Channel MOSFET

PDFN56



Pin Definition:

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

Key Parameter Performance

Parameter		Value	Unit
V_{DS}		30	V
$R_{DS(on)}$ (max)	V_{GS} = 10V	2	mΩ
	V_{GS} = 4.5V	3	
Q_g		82	nC

Features

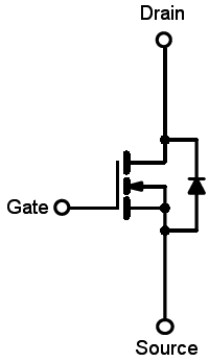
- Low On-Resistance
- Low Input Capacitance
- Low Gate Charge

Ordering Information

Part No.	Package	Packing
TSM020N03PQ56 RLG	PDFN56	2.5kpcs / 13” Reel

Note: “G” denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Block Diagram



N-Channel MOSFET

Absolute Maximum Ratings (T_C=25°C unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (Note 3)	T_C=25°C	I_D	130	A
	T_A=25°C		38	
Drain Current-Pulsed (Note 1)		I_{DM}	500	A
Single Pulse Avalanche Energy, L=0.1mH		E_{AS}	151	mJ
Maximum Power Dissipation (Note 2)	T_C=25°C	P_D	83	W
	T_A=25°C		3.6	
Storage Temperature Range		T_{STG}	-55 to +150	°C
Operating Junction Temperature Range		T_J	-55 to +150	°C

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\Theta JC}$	1.5	°C/W
Thermal Resistance - Junction to Ambient	$R_{\Theta JA}$	35	°C/W

Electrical Specifications (T_J=25°C unless otherwise noted)

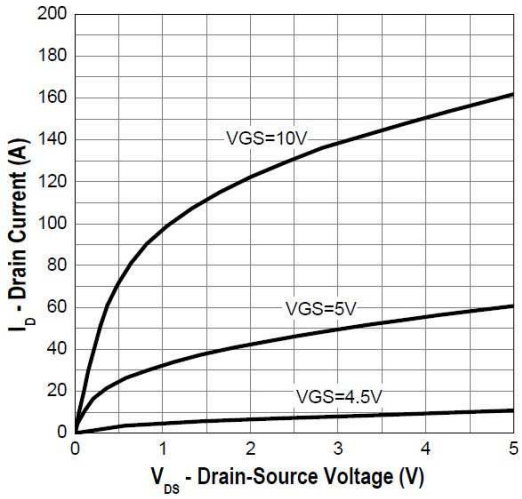
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	30	--	--	V
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 30A	$R_{DS(ON)}$	--	1.5	2	mΩ
	V_{GS} = 4.5V, I_D = 15A		--	2.3	3	
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(TH)}$	1.2	--	2.5	V
Zero Gate Voltage Drain Current	V_{DS} = 24V, V_{GS} = 0V	I_{DSS}	--	--	1	μA
Gate Body Leakage	V_{GS} = ±20V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Dynamic						
Total Gate Charge	V_{DD} = 15V, I_D = 30A, V_{GS} = 10V	Q_g	--	82	--	nC
Gate-Source Charge		Q_{gs}	--	24	--	
Gate-Drain Charge		Q_{gd}	--	5	--	
Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	4222	--	pF
Output Capacitance		C_{oss}	--	889	--	
Reverse Transfer Capacitance		C_{rss}	--	398	--	
Switching						
Turn-On Delay Time	V_{GS} = 10V, V_{DS} = 15V, R_G = 3Ω, I_D = 30A	$t_{d(on)}$	--	22	--	ns
Turn-On Rise Time		t_r	--	7	--	
Turn-Off Delay Time		$t_{d(off)}$	--	100	--	
Turn-Off Fall Time		t_f	--	18	--	
Drain-Source Diode Characteristics and Maximum Rating						
Drain-Source Diode Forward Voltage	V_{GS}=0V, I_S=30A	V_{SD}	--	--	1.3	V
Reverse Recovery Time	I_S = 30A, dI/dt = 100A/μs	t_{fr}	--	32	--	ns
Reverse Recovery Charge		Q_{rr}	--	120	--	nC

Notes:

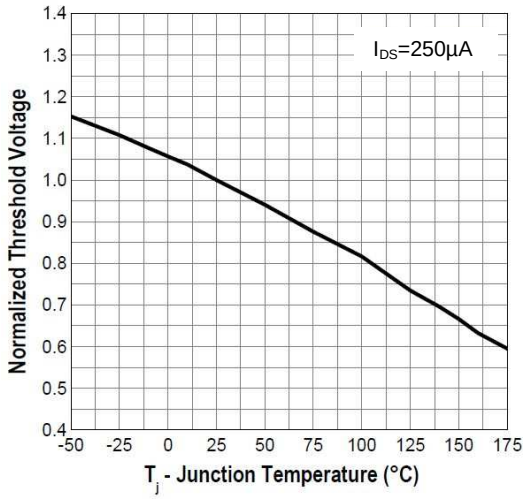
1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
2. $R_{\Theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. $R_{\Theta JA}$ is guaranteed by design while $R_{\Theta CA}$ is determined by the user's board design. $R_{\Theta JA}$ shown below for single device operation on FR-4 PCB in still air.
3. The maximum current rating is limited by package.

Electrical Characteristics Curves

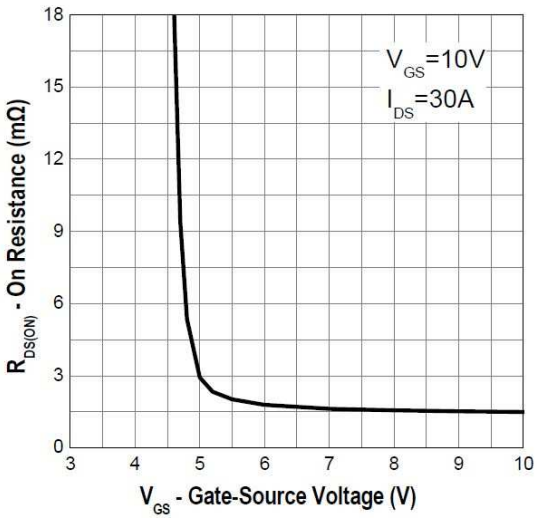
Output Characteristics



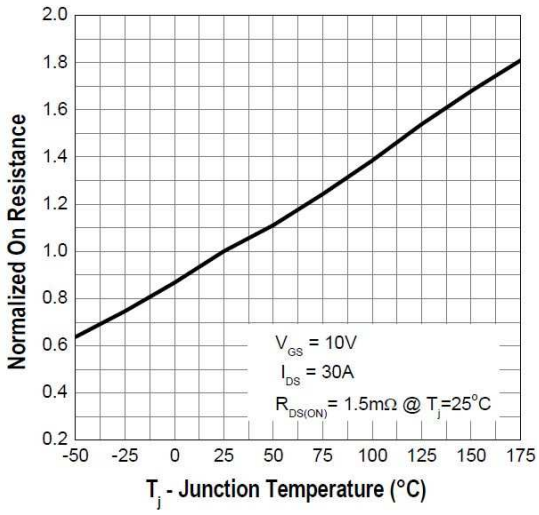
Gate Threshold Voltage



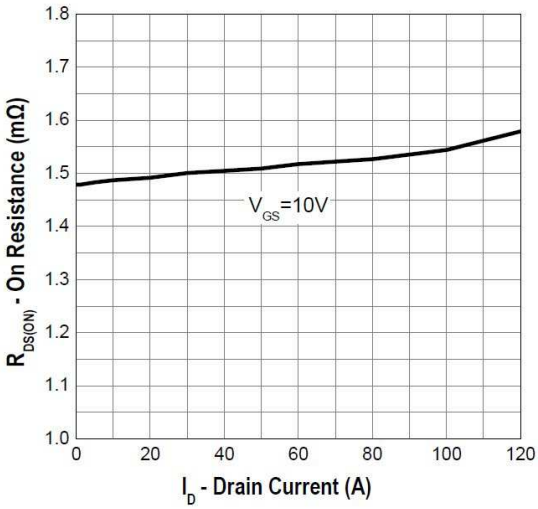
Gate Source On Resistance



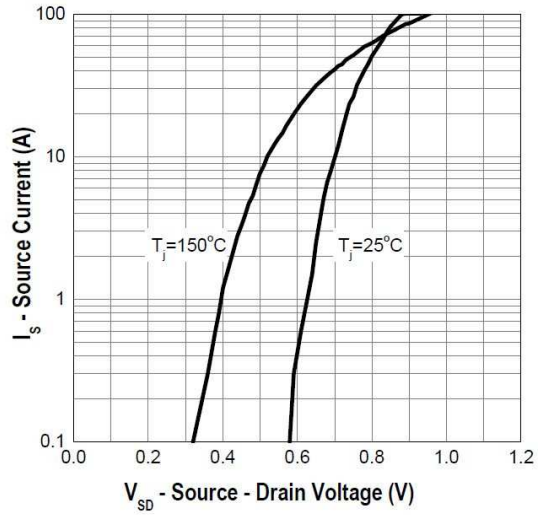
Drain-Source On Resistance



Drain-Source On-Resistance



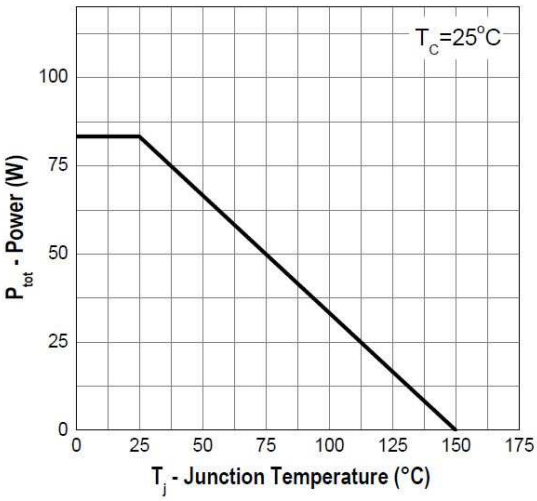
Source-Drain Diode Forward Voltage



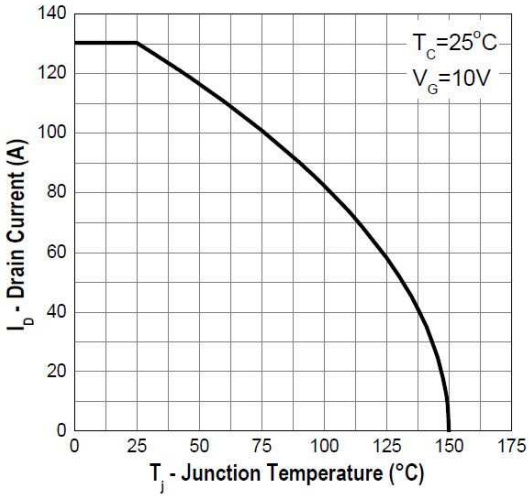
Pb-Free RoHS COMPLIANT

Electrical Characteristics Curves

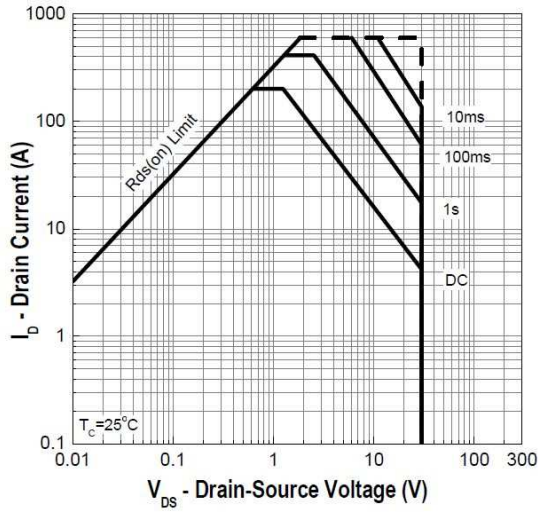
Power Derating



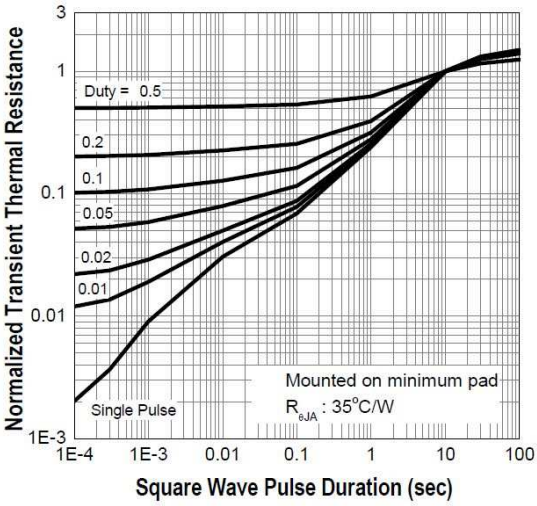
Drain Current vs. Junction Temperature



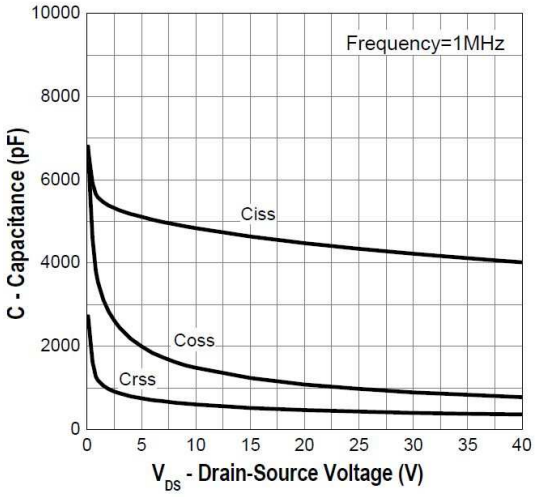
Safe Operation Area



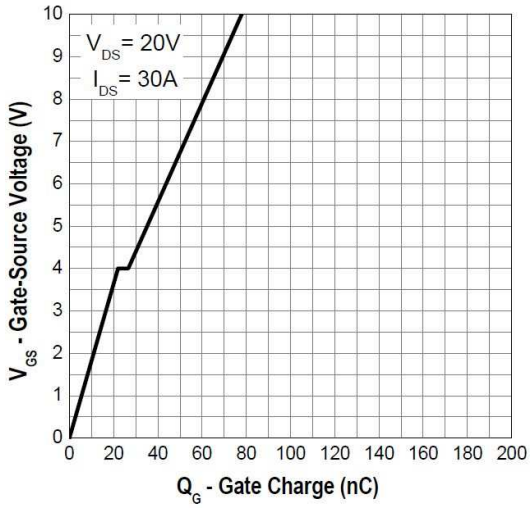
Transient Thermal Impedance



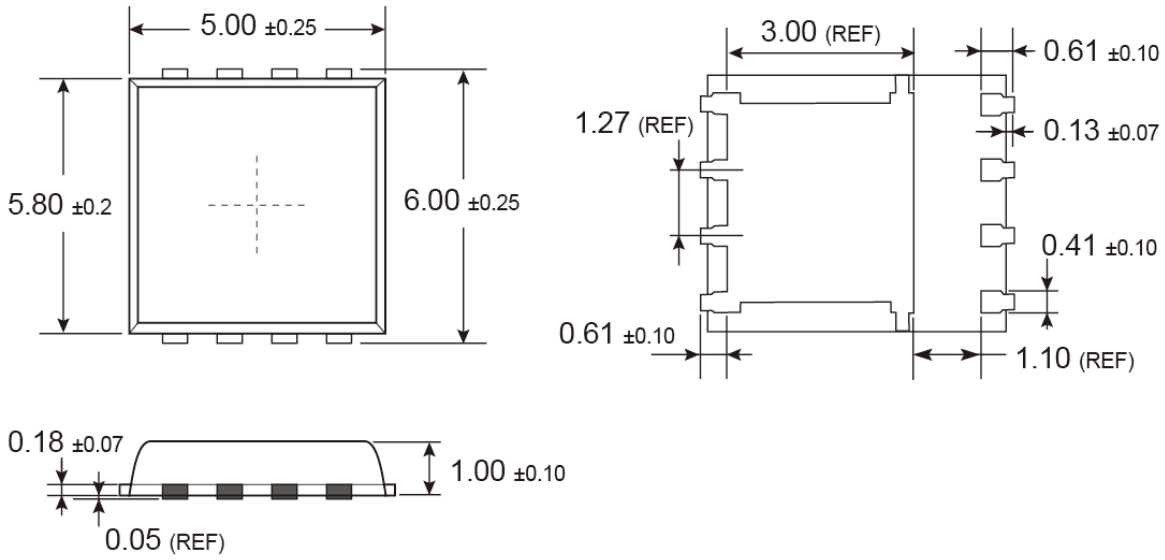
Capacitance



Gate Charge

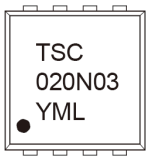


PDFN56 Mechanical Drawing



Unit: Millimeters

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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