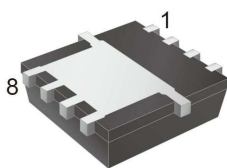


PDFN56



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}	100	V
$R_{DS(on)}(max)$	12	m Ω
Q_g	145	nC

Features

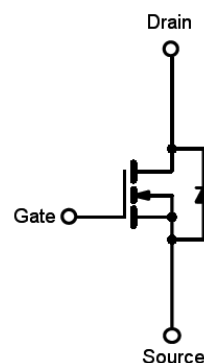
- Low On-Resistance
- Low Input Capacitance
- Low Gate Charge

Ordering Information

Part No.	Package	Packing
TSM120N10PQ56 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 ($T_c=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^(Note 3)	I_D	$T_C=25^{\circ}C$	58
		$T_A=25^{\circ}C$	16.1
Drain Current-Pulsed ^(Note 1)	I_{DM}	150	A
Single Pulse Avalanche Energy: L=0.5mH	E_{AS}	156	mJ
Maximum Power Dissipation ^(Note 2)	P_D	$T_C=25^{\circ}C$	36
		$T_A=25^{\circ}C$	2
Storage Temperature Range	T_{STG}	-55 to +150	$^{\circ}C$
Operating Junction Temperature Range	T_J	-55 to +150	$^{\circ}C$

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	1.2	$^{\circ}C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	$^{\circ}C/W$

Electrical Specifications ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

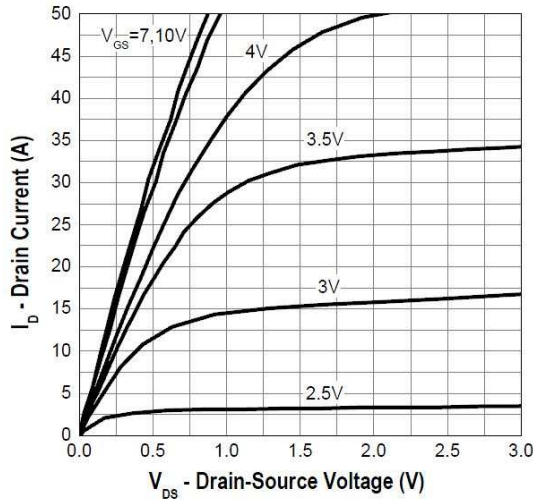
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	100	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 30A$	$R_{DS(ON)}$	--	10	12	m Ω
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	2	3	4	V
Zero Gate Voltage Drain Current	$V_{DS} = 80V, V_{GS} = 0V$	I_{DSS}	--	--	1	μA
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Dynamic						
Total Gate Charge	$V_{DS} = 50V, I_D = 30A,$ $V_{GS} = 10V$	Q_g	--	145	--	nC
Gate-Source Charge		Q_{gs}	--	25	--	
Gate-Drain Charge		Q_{gd}	--	43	--	
Input Capacitance	$V_{DS} = 30V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	C_{iss}	--	3902	--	pF
Output Capacitance		C_{oss}	--	251	--	
Reverse Transfer Capacitance		C_{rss}	--	93	--	
Switching						
Turn-On Delay Time	$V_{GS} = 10V, V_{DS} = 50V,$ $R_G = 3\Omega, I_D = 30A$	$t_{d(on)}$	--	27	--	ns
Turn-On Rise Time		t_r	--	13	--	
Turn-Off Delay Time		$t_{d(off)}$	--	15	--	
Turn-Off Fall Time		t_f	--	42	--	
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	$I_S = 30A, di/dt = 100A/\mu s$	t_{rr}	--	65	--	ns
Reverse Recovery Charge		Q_{rr}	--	175	--	nC

Notes:

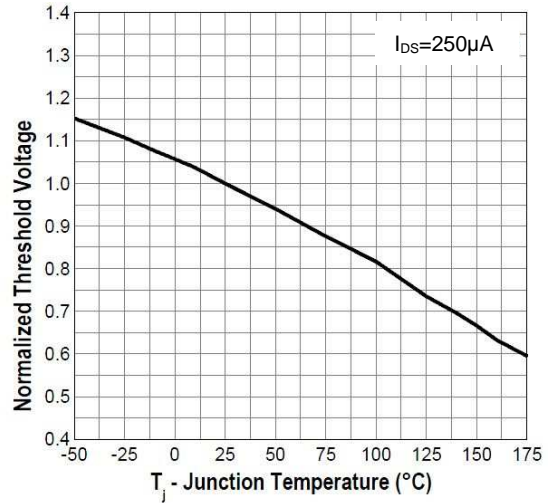
- Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. $R_{\theta JA}$ is guaranteed by design while $R_{\theta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

Electrical Characteristics Curves

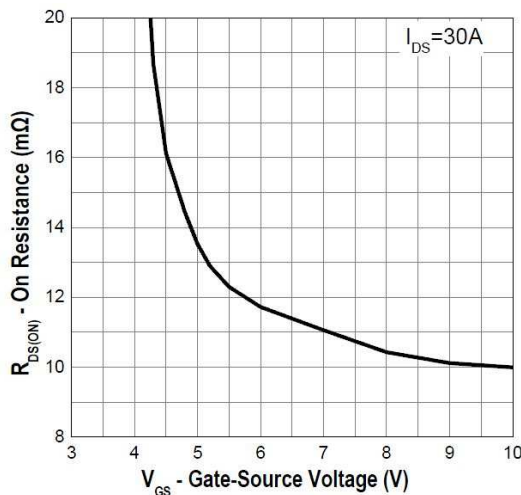
Output Characteristics



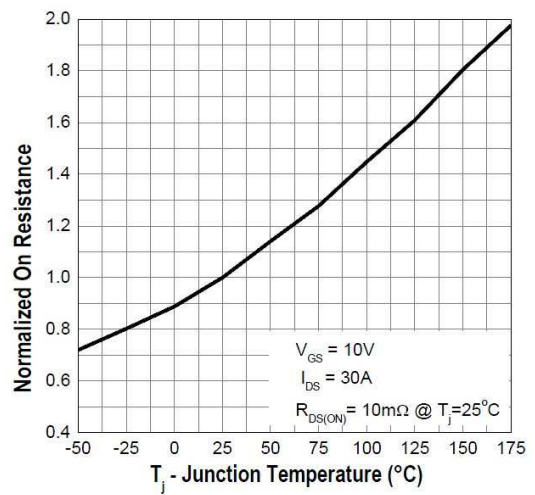
Gate Threshold Voltage



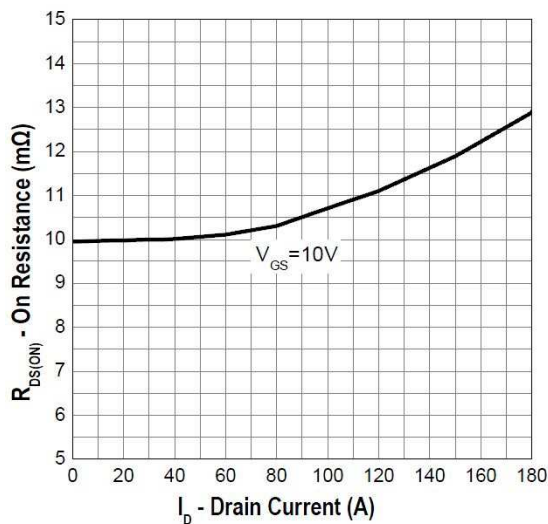
Gate Source On Resistance



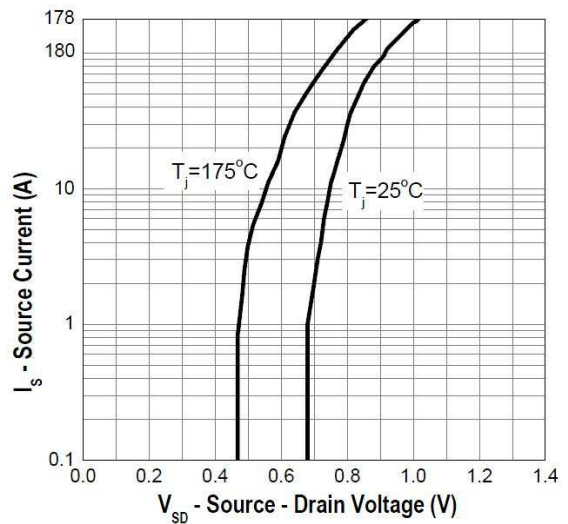
Drain-Source On Resistance



Drain-Source On-Resistance

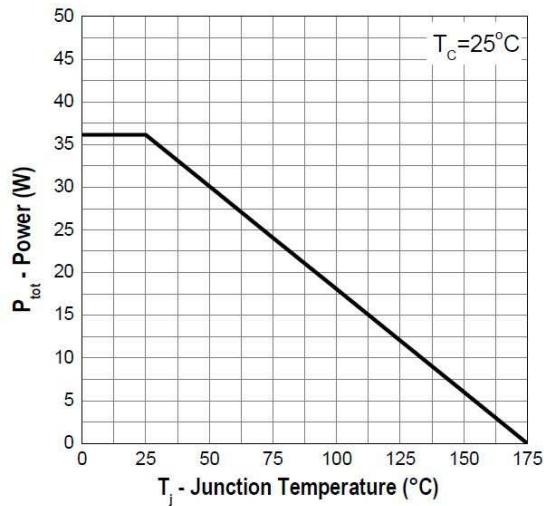


Source-Drain Diode Forward Voltage

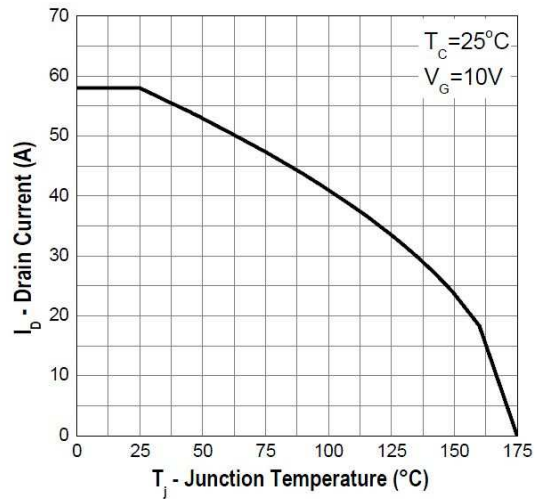


Electrical Characteristics Curves

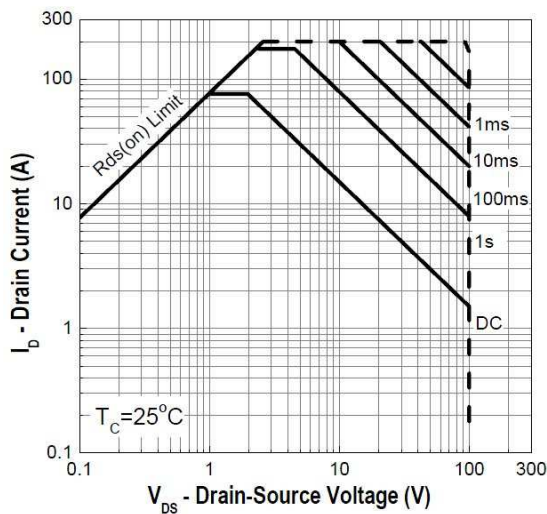
Power Derating



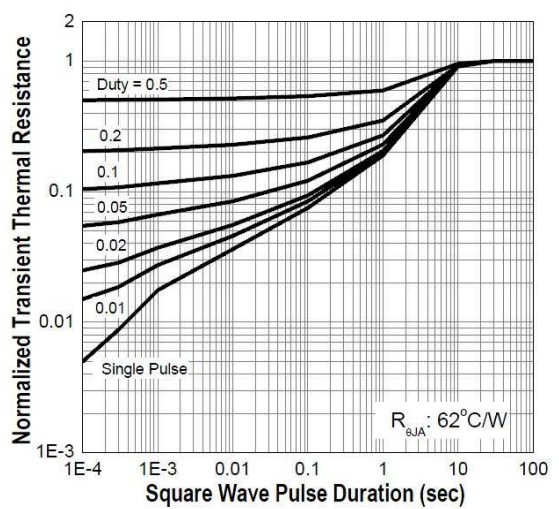
Drain Current vs. Junction Temperature



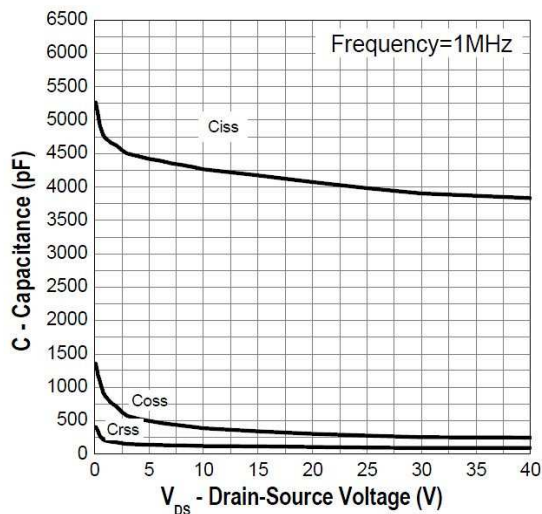
Safe Operation Area



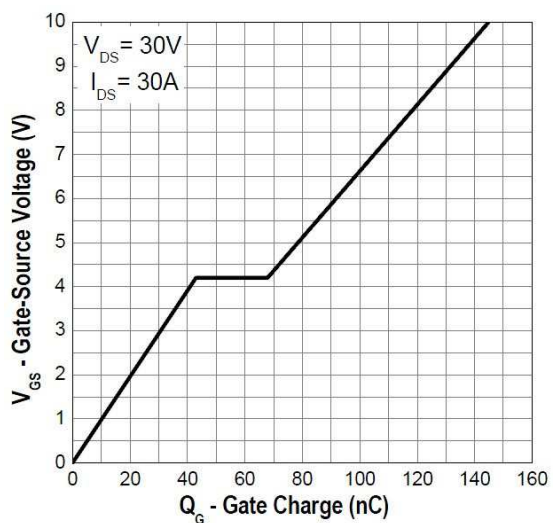
Transient Thermal Impedance



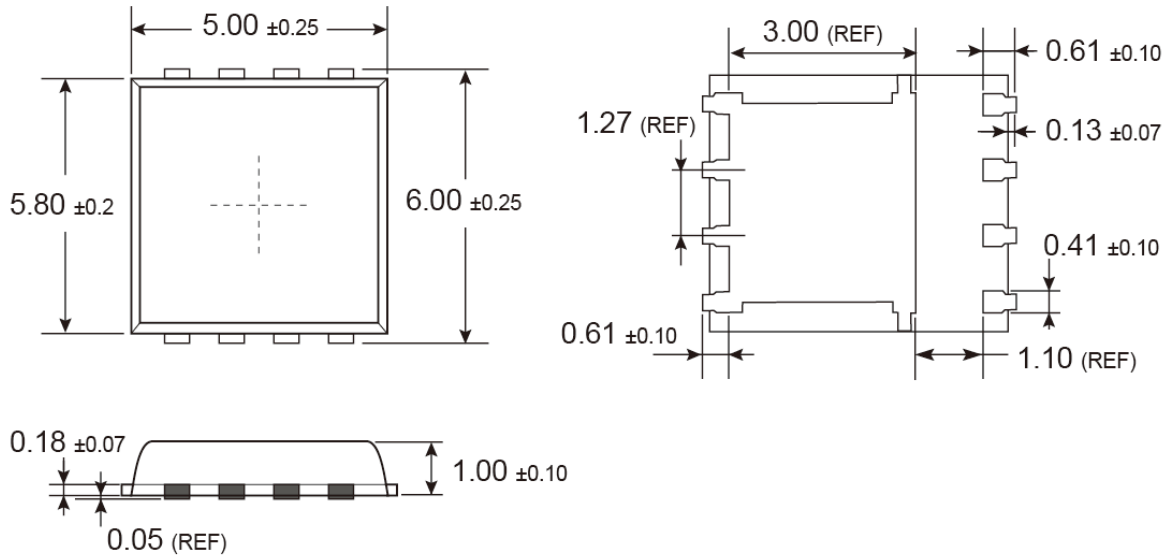
Capacitance



Gate Charge

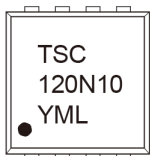


PDFN56 Mechanical Drawing



Unit: Millimeters

Marking Diagram



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

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