MST1018TQ

100V 14mΩ N-Ch Power MOSFET

Features

- Low Gate Charge
- High Current Capability
- 100% UIS Tested, 100% R_g Tested

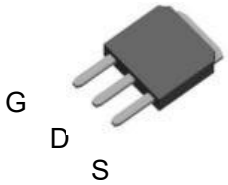
Product Summary

Parameter	Value	Unit
V_{DS}	100	V
$V_{GS(th)\_Typ}$	1.9	V
I_D (@ V_{GS} = 10V) (1)	40	A
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 10V)	14.0	mΩ
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 4.5V)	18.5	mΩ

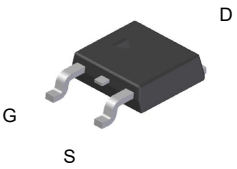
Applications

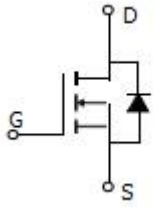
- Power Managerment in Telecom., Industrial Automation, CE
- Current Switching in DC/DC & AC/DC Sub-systems
- Motor Driving in Power Tool, E-vehicle, Robotics

TO251-3L Top View



TO252-3L Top View





Ordering Information

Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
MST1018TQ	TO252-3L	3	MST1018A	3	-55 to 150	13-inch Reel	2500
MST1018TQ	TO251-3L	3	MST018A	N/A	-55 to 150	Tube	80

Absolute Maximum Ratings (@ T_A = 25 °C unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DS}	100	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (1)	T_C = 25°C	I_D	40	A
	T_C = 100°C		25	
Pulsed Drain Current (2)		I_{DM}	116	A
Avalanche Current (3)		I_{AS}	22	A
Avalanche Energy (3)		E_{AS}	24	mJ
Power Dissipation (4)	T_C = 25°C	P_D	52	W
	T_C = 100°C		21	
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

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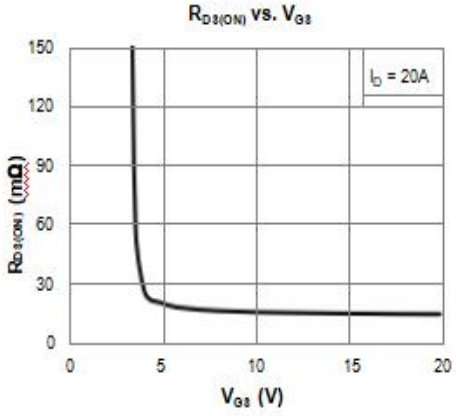
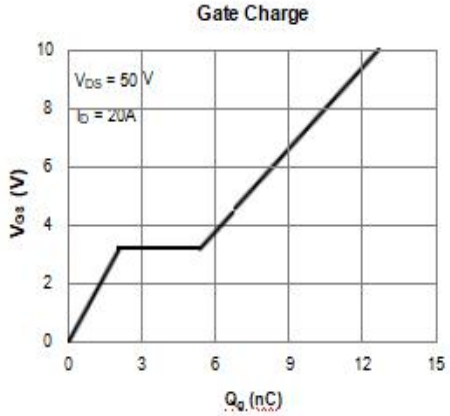




Electrical Characteristics (@ T_J = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 250μA, V_{GS} = 0V	100			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 80V, V_{GS} = 0V			1.0	μA
		T_J = 55°C			5.0	
Gate-Body Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.2	1.9	2.5	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 10A		14.0	17.0	mΩ
	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 6A		18.5	23	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A		48		S
Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V		0.7	1.0	V
Diode Continuous Current	I_S	T_C = 25°C			52	A
DYNAMIC PARAMETERS (5)						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 50V, f = 1MHz		769		pF
Output Capacitance	C_{oss}			171		pF
Reverse Transfer Capacitance	C_{rss}			5.1		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz		1.9		Ω
SWITCHING PARAMETERS (5)						
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V, V_{DS} = 50V, I_D = 10A		12.7		nC
Total Gate Charge (@ V_{GS} = 6.0V)	Q_g			6.7		nC
Gate Source Charge	Q_{gs}			2.1		nC
Gate Drain Charge	Q_{gd}			3.3		nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 50V, R_L = 2.5Ω, R_{GEN} = 6Ω		4.3		ns
Turn-On Rise Time	t_r			5.1		ns
Turn-Off DelayTime	$t_{D(off)}$			16.7		ns
Turn-Off Fall Time	t_f			8.7		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 15A, dI_F/dt = 100A/μs		39		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 15A, dI_F/dt = 100A/μs		30		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	42	50	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.8	2.4	°C/W

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under T_{J_Max} = 150°C.
3. This single-pulse measurement was taken under the following condition [L = 100μH, V_{GS} = 10V, V_{DS} = 50V] while its value is limited by T_{J_Max} = 150°C.
4. The power dissipation P_D is based on T_{J_Max} = 150°C.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics

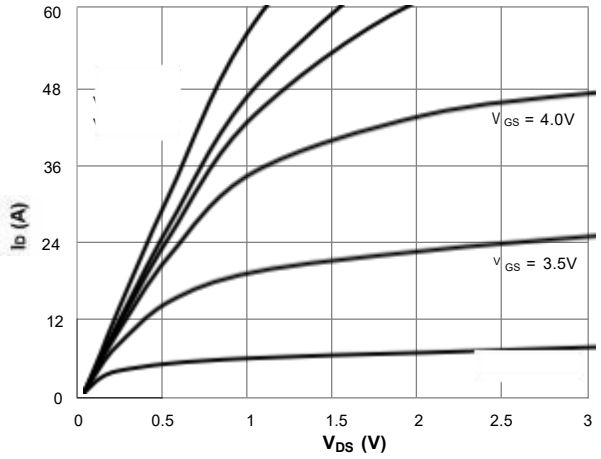


Figure 1: Saturation Characteristics

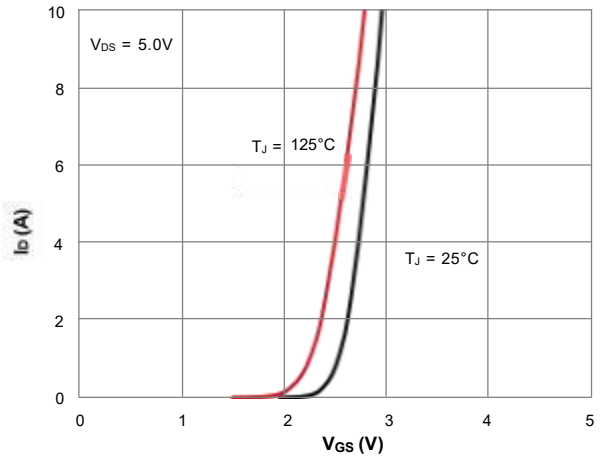


Figure 2: Transfer Characteristics

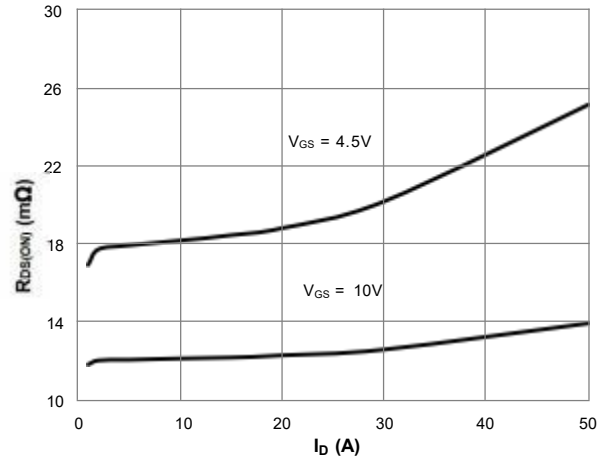


Figure 3: $R_{DS(ON)}$ vs. Drain Current

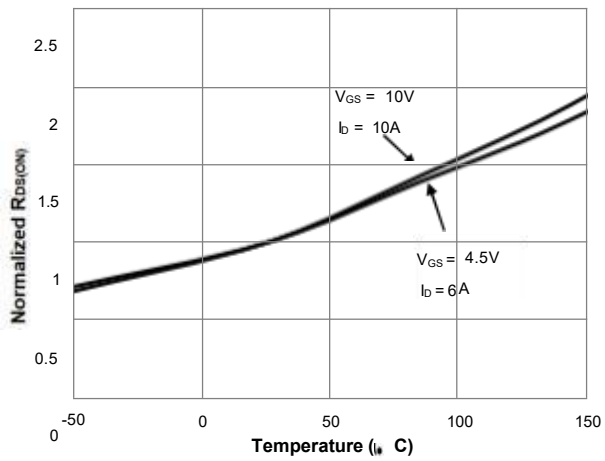


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

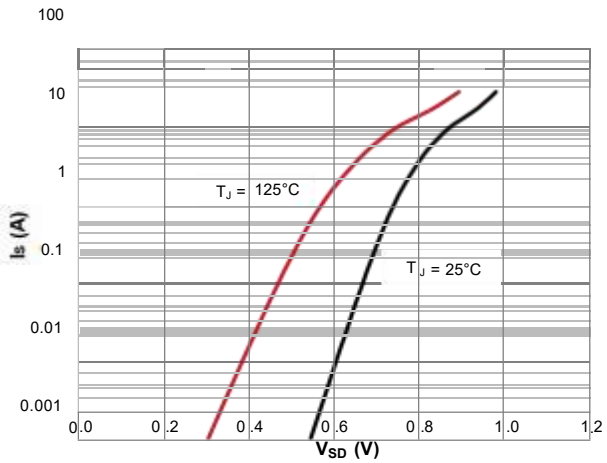


Figure 5: Body-Diode Characteristics

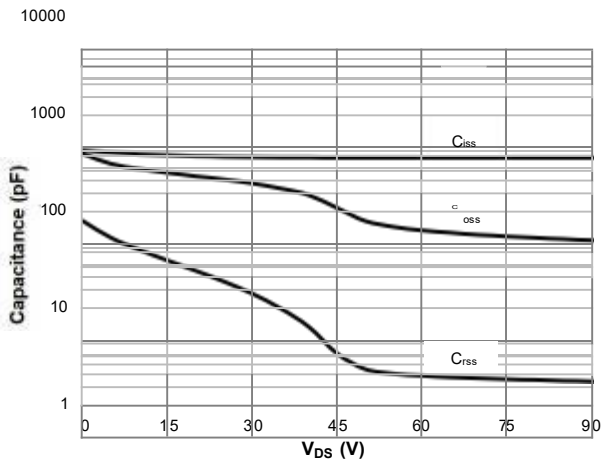


Figure 6: Capacitance Characteristics

Typical Electrical & Thermal Characteristics

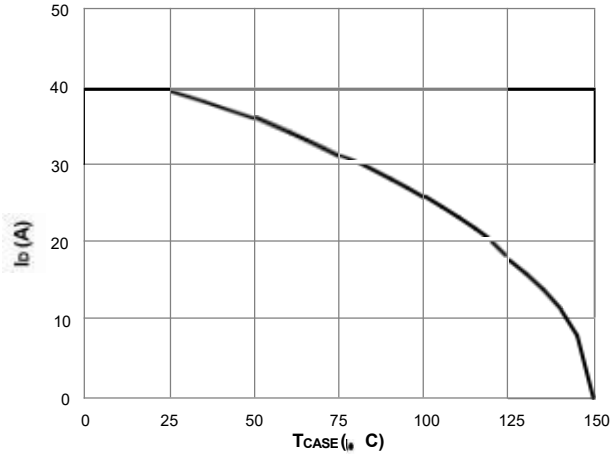


Figure 7: Current De-rating

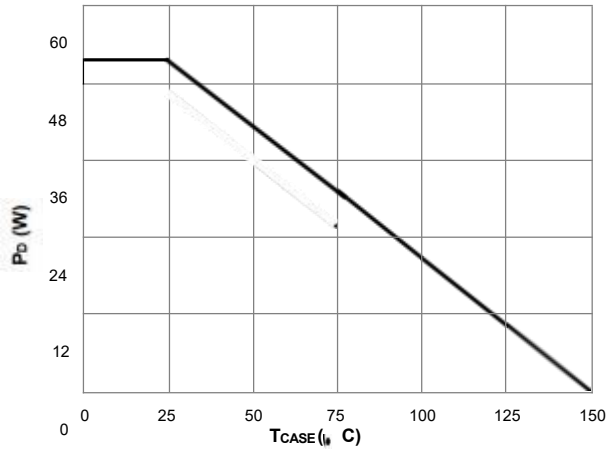


Figure 8: Power De-rating

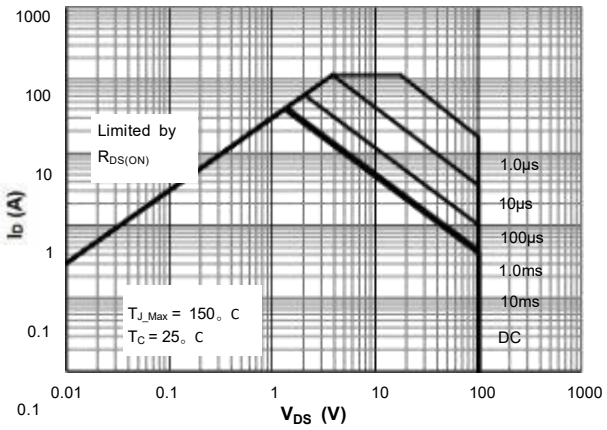


Figure 9: Maximum Safe Operating Area

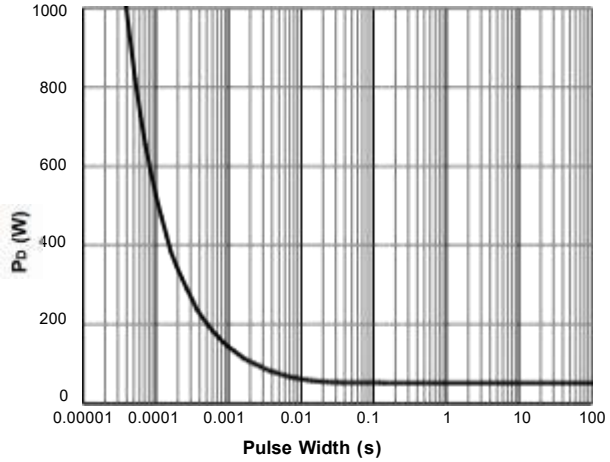


Figure 10: Single Pulse Power Rating, Junction-to-Case

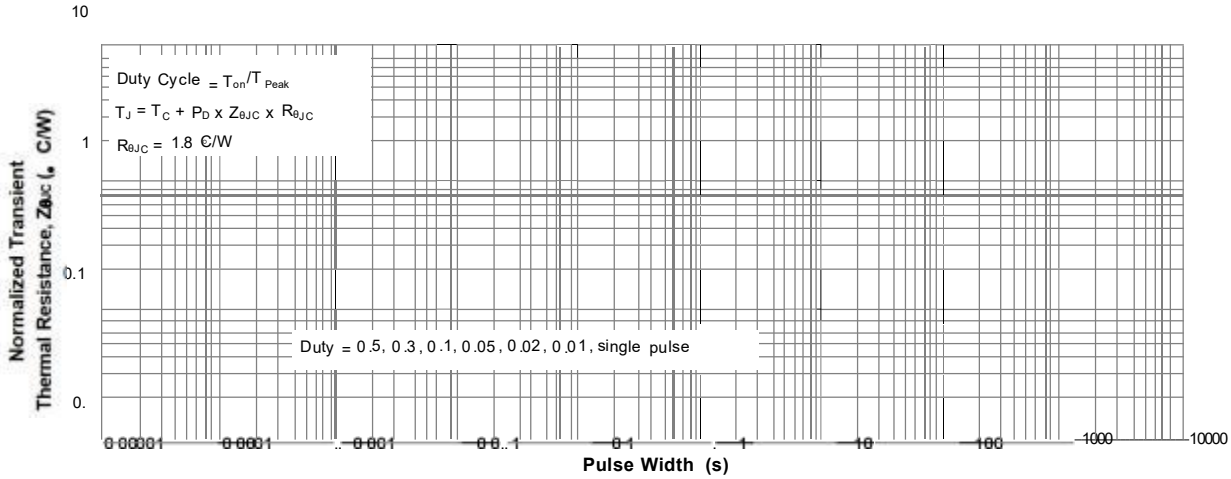
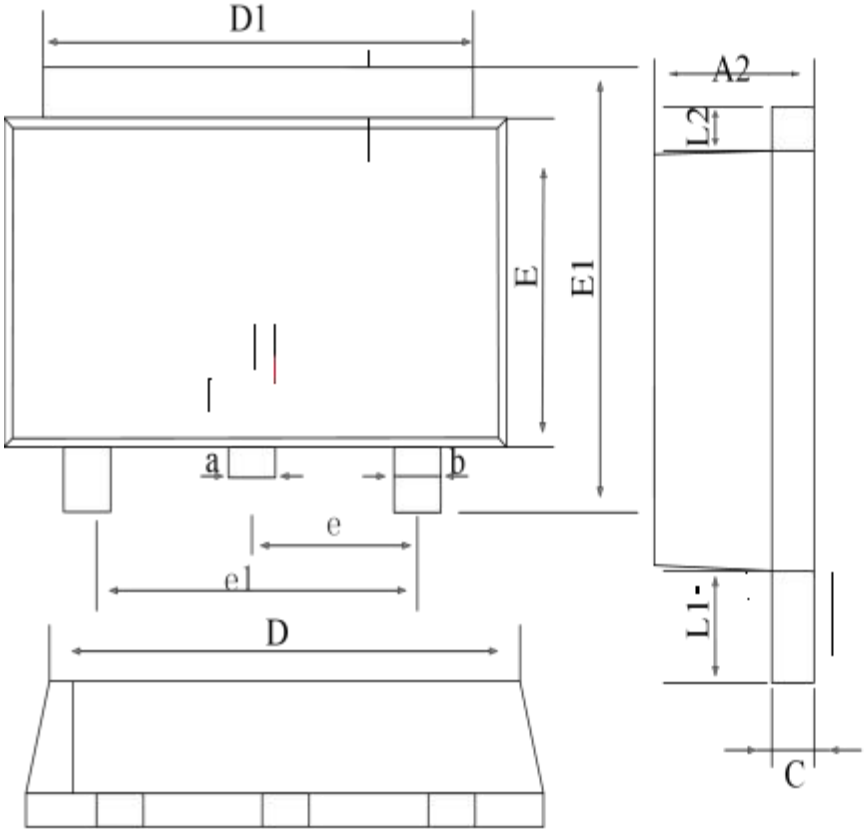


Figure 11: Normalized Maximum Transient Thermal Impedance

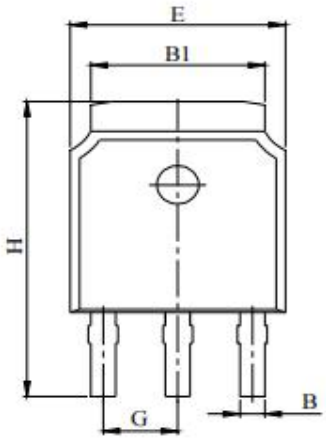
Package Outline

TO252-3L

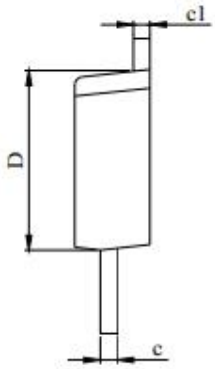


REF.	Millimeter	
	Min.	Max.
A2	2.2	2.4
a	0.64	0.88
b	0.64	0.88
c	0.45	0.58
D	6.45	6.70
D1	5.21	5.46
E	6.00	6.20
E1	9.40	10.40
e	2.28	2.30
e1	4.56	4.60
L1	2.70	2.75
L2	0.90	1.27

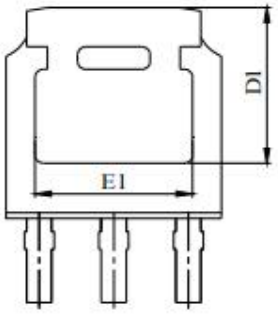
TO251-3L



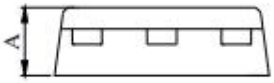
Top View



Side View



Bottom View



Front View

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.10		2.50
B	0.66		0.86
B1	5.15		5.48
c	0.44		0.58
c1	0.44		0.58
D	5.90		6.30
D1	5.30 REF		
E	6.40		6.80
E1	4.83 REF		
G	2.19	2.29	2.39
H	10.60		11.80