



■ **Description**

The MST40N50 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications.

■ **Application**

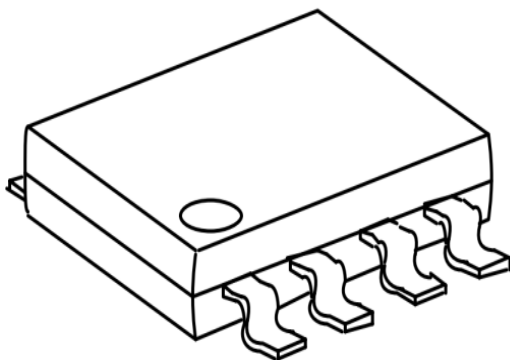
Load switching

Hard switched and high frequency circuits

DC-DC Convertor

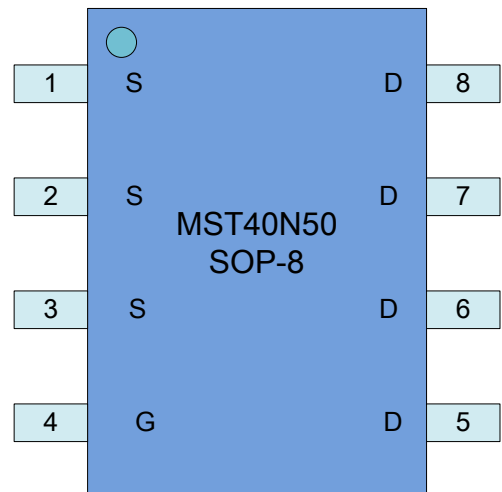
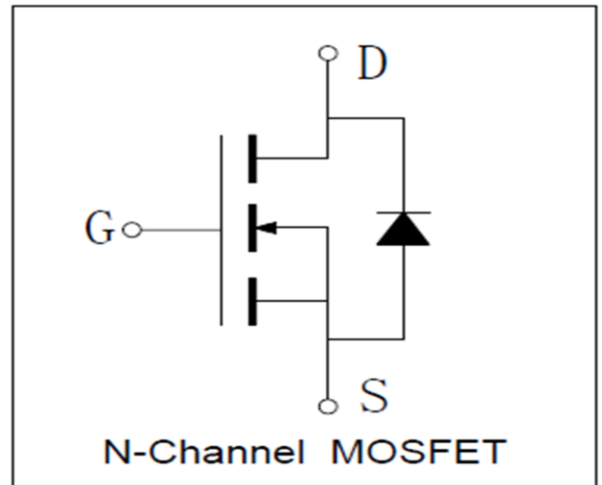
Others

■ **Packages**



■ **Features**

- High density cell for ultra low on-resistance
- Vdss(Minimum) = 40V
- Id(Maximum) = 50A
- Rds(on) = 13 mΩ (Typ.) @ VGS=10V
- Rds(on) = 18 mΩ (Typ.) @ VGS=4.5V
- Excellent package for good heat dissipation and tiny solution size



■ Pin Assignments

PIN	DISCRIPTION
1,2,3	Source
4	Gate
5,6,7,8	Drain

■ Description

It utilizes the latest trench processing techniques to achieve extremely low on resistance, fast switching speed and high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications.

■ Absolute max Rating:

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C=25^\circ\text{C}$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	40	V	
V_{GSS}	Gate-Source Voltage	± 20		
T_J	Maximum Junction Temperature	175	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$	
I_S	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$	50	A
Mounted on Large Heat Sink				
I_{DP}	300 μs Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	200 ^①	A
I_D	Continuous Drain Current(VGS=10V)	$T_C=25^\circ\text{C}$	50 ^②	A
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	50 ^②	W
Drain-Source Avalanche Ratings				
E_{AS} ^③	Avalanche Energy, Single Pulsed		100	mJ

■ Electrical Characterizes ($T_A=25^\circ\text{C}$ Unless Otherwise Noted)



Symbol	Parameter	Test Condition	R013AC			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$			1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.5	2	2.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{④}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=25A$		13	18	$m\Omega$
		$V_{GS}=4.5V, I_{DS}=20A$		18	28	$m\Omega$
Diode Characteristics						
$V_{SD}^{④}$	Diode Forward Voltage	$I_{SD}=25A, V_{GS}=0V$			1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=25A, di_{SD}/dt=100A/\mu s$		14		ns
Q_{rr}	Reverse Recovery Charge			32		nC
Dynamic Characteristics ^⑤						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$		1.2		Ω
C_{ISS}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=20V,$ Frequency=1.0MHz		980		pF
C_{OSS}	Output Capacitance			160		
C_{RSS}	Reverse Transfer Capacitance			80		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=20V, R_L=15\Omega,$ $I_{DS}=25A, V_{GEN}=10V,$ $R_G=6\Omega$		6		ns
t_r	Turn-on Rise Time			10		
$t_{d(OFF)}$	Turn-off Delay Time			24		
t_f	Turn-off Fall Time			5		
Gate Charge Characteristics ^⑤						
Q_g	Total Gate Charge	$V_{DS}=20V, V_{GS}=10V,$ $I_{DS}=25A$		18		nC
Q_{gs}	Gate-Source Charge			2.5		
Q_{gd}	Gate-Drain Charge			5		

Notes: ① Pulse width limited by safe operating area.

② When mounted on 1 inch square copper board, $t \leq 10sec$, TO252 package. The value in any given application depends on the user's specific board design.

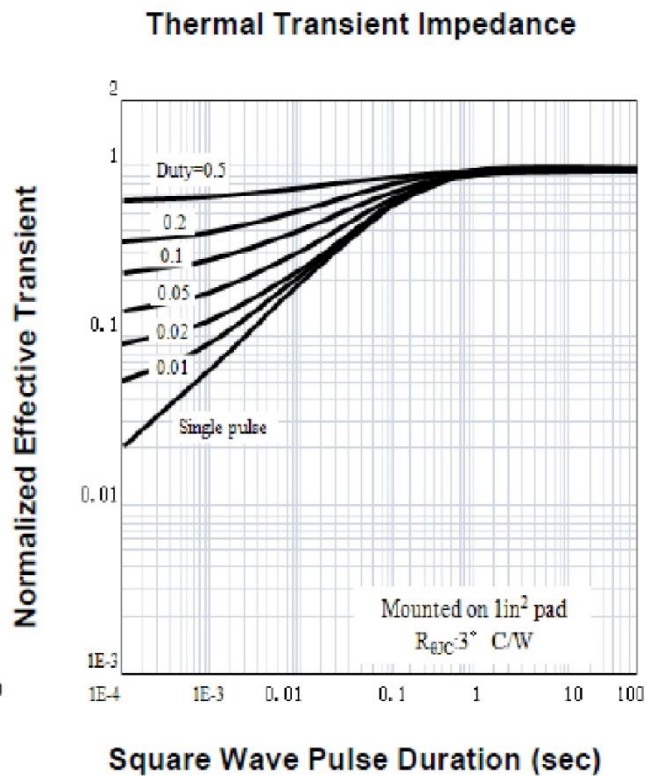
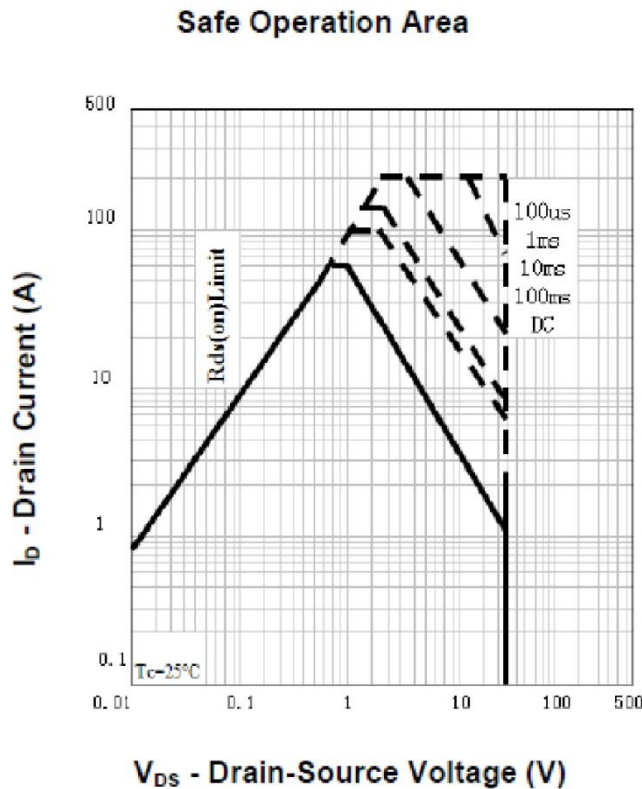
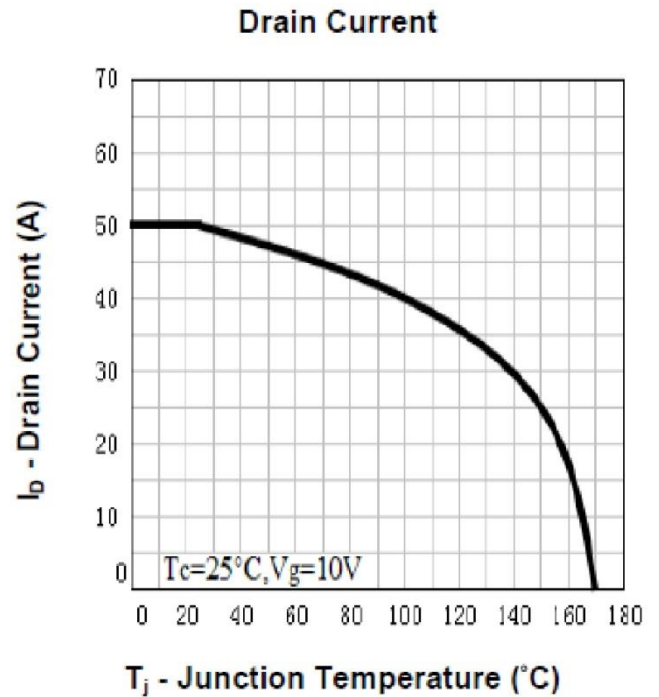
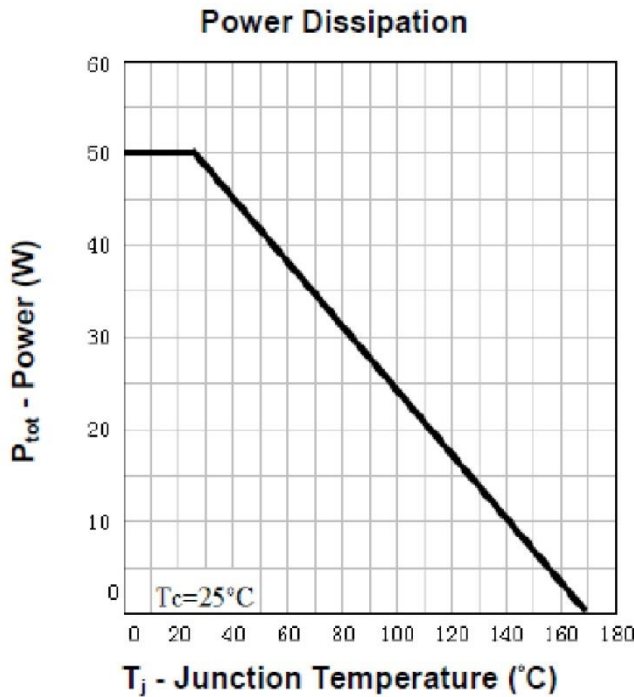
③ Limited by T_{Jmax} , $I_{AS} = 20A$, $V_{DD} = 30V$, $R_G = 50\Omega$, Starting $T_J = 25^\circ C$.

④ Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

⑤ Guaranteed by design, not subject to production testing.

■ Typical Characteristics

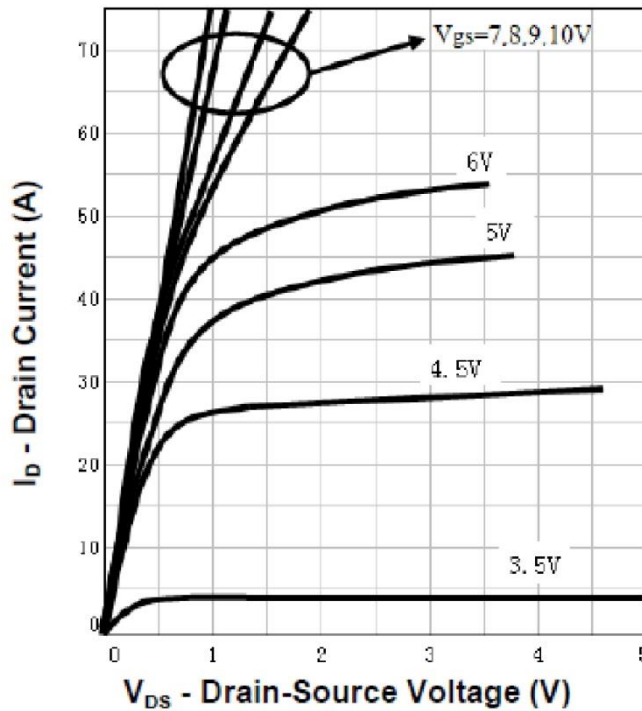
Typical Characteristics



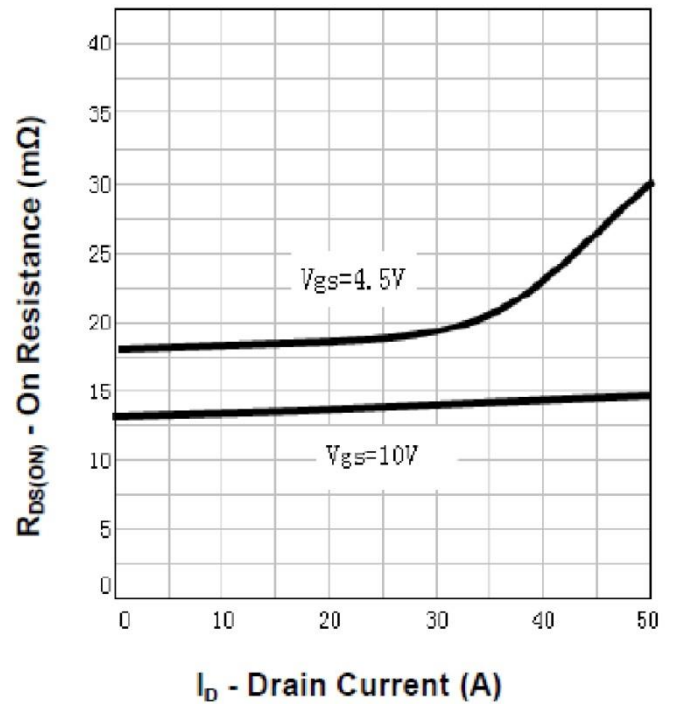


Typical Characteristics

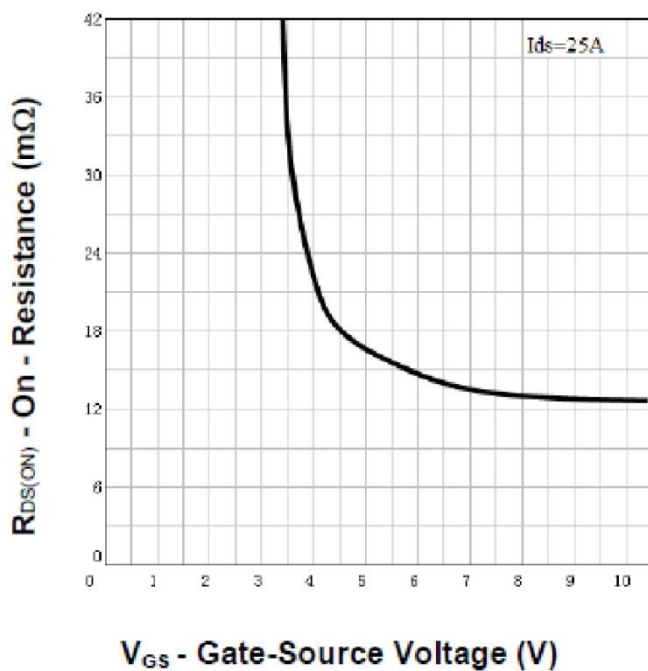
Output Characteristics



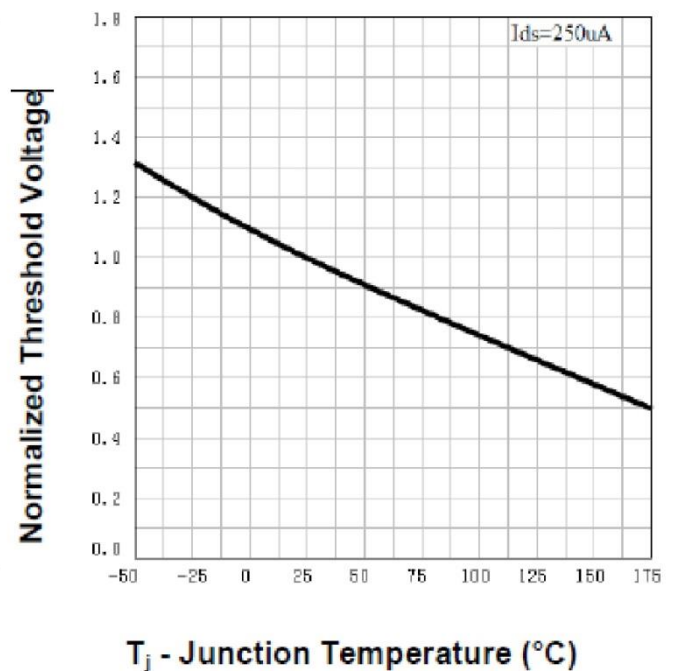
Drain-Source On Resistance



Drain-Source On Resistance

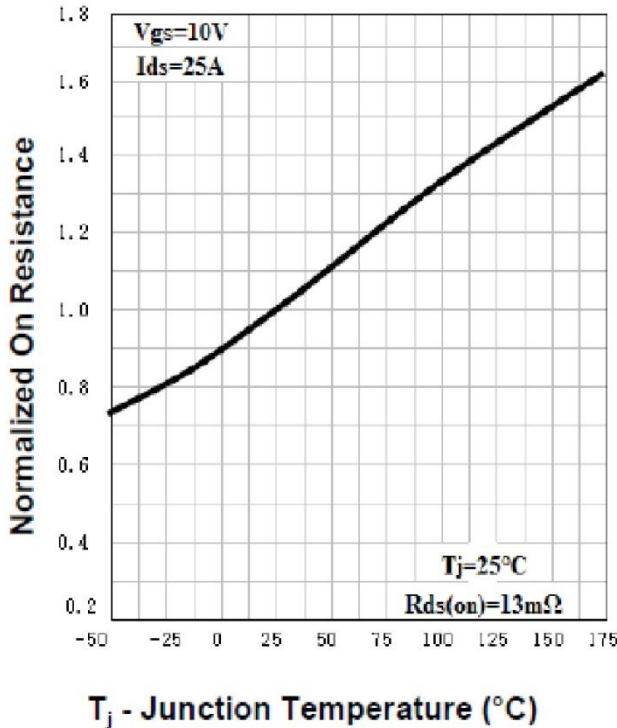


Gate Threshold Voltage

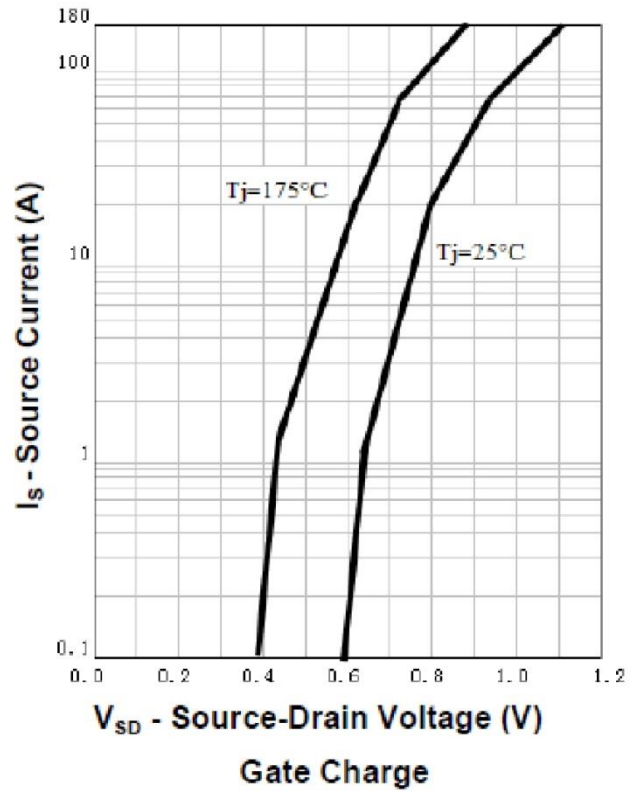


Typical Characteristics

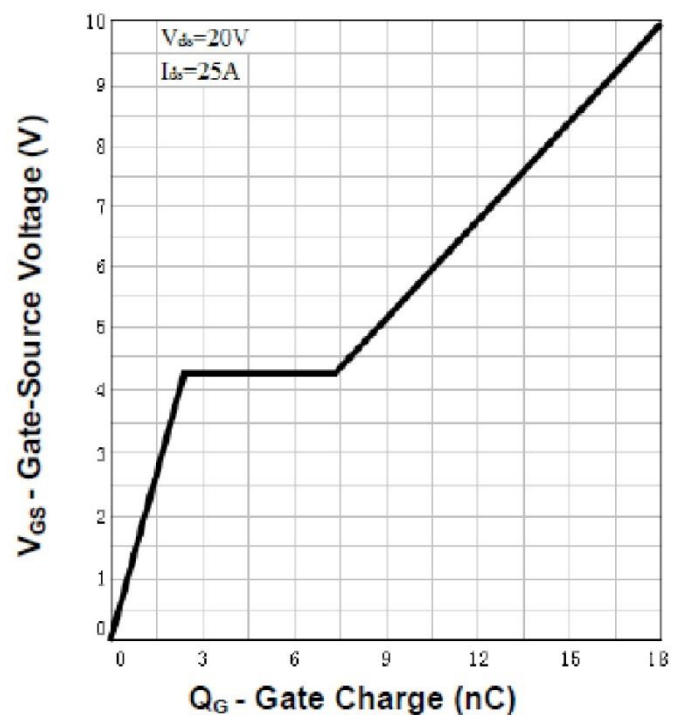
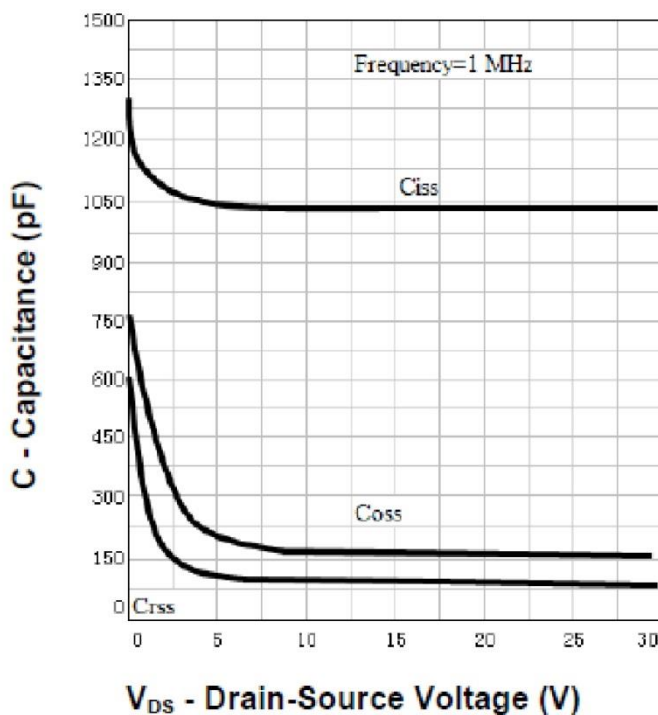
Drain-Source On Resistance



Source-Drain Diode Forward

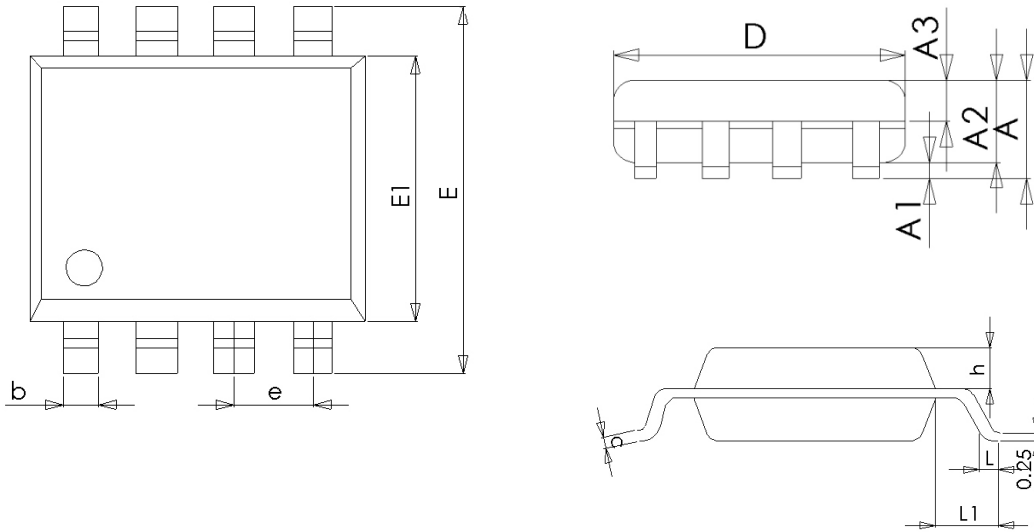


T_j - Junction Temperature ($^{\circ}\text{C}$)
Capacitance



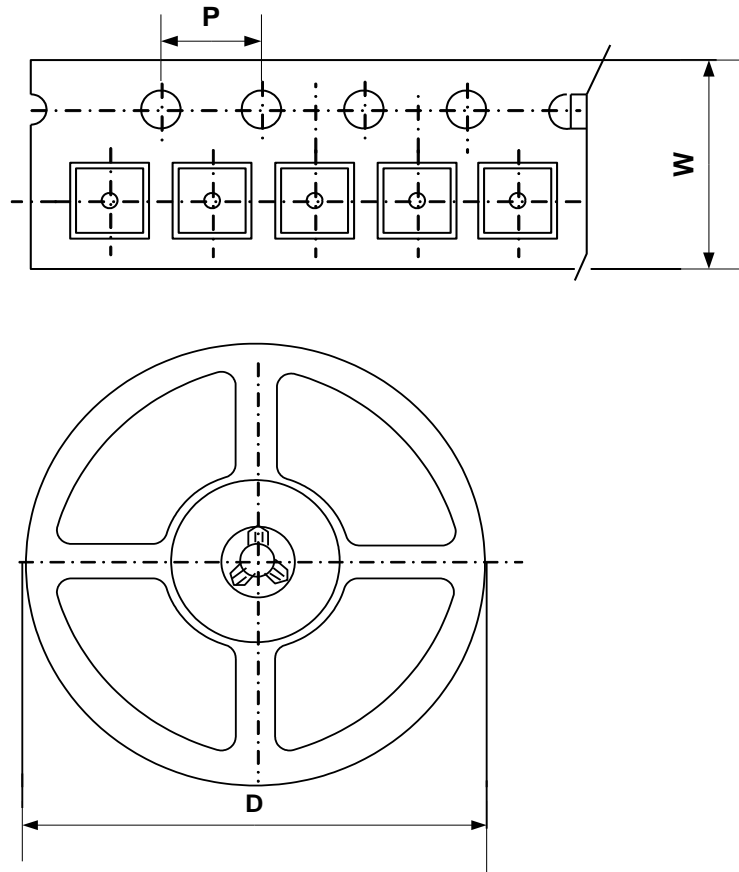


■ PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		
	Min	NOM	Max
A	--	--	1.65
A1	0.05	--	0.15
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
h	0.25	--	0.50
L	0.50	0.60	0.80
L1	1.05BSC		

■ TAPE AND REEL INFORMATION



Package Type	Carrier Width (W)	Pitch (P)	Reel Size(D)	Packing Minimum
SOP8	12.0±0.1 mm	8.0±0.1 mm	330±1 mm	2500pcs

Note: Carrier Tape Dimension, Reel Size and Packing Minimum