

Description

The MS220N10P/T uses advanced **SGT₁** technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 100V$ $I_D = 220A$

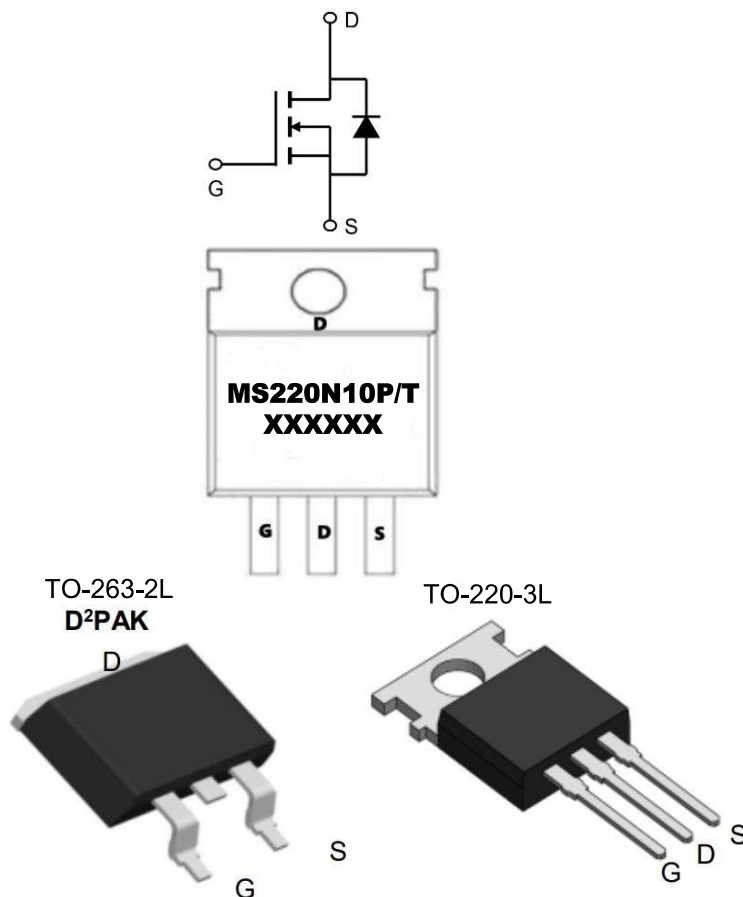
$R_{DS(ON)} < 2.8m\Omega$ @ $V_{GS} = 10V$ (Type: $2.4m\Omega$)

Application

DC/DC Converter

LED Backlighting

Power Management Switches



Package Marking and Ordering Information

Product ID	Package	Marking	Qty(PCS)
MS220N10P	TO-220-3L	MS220N10P XXXXXX	1000
MS220N10T	TO-263-2L	MS220N10T XXXXXX	800

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	220	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	163	A
I_{DM}	Pulsed Drain Current	900	A
E_{AS}	Single Pulse Avalanche Energy	1028	mJ
I_{AS}	Avalanche Current	54	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ⁴	379	W
TSTG	Storage Temperature Range	-55 to 175	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	60	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	0.33	$^\circ C/W$

Electrical Characteristics (T_C=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	100	107	-	V
IGSS	Gate-body Leakage current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
IDSS	Zero Gate Voltage Drain Current T _J =25°C	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
IDSS	Zero Gate Voltage Drain Current T _J =100°C		-	-	100	
VGS(th)	Gate-Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
RDS(on)	Drain-Source on-Resistance ⁴	V _{GS} =10V, I _D =20A	-	2.4	2.8	mΩ
gfs	Forward Transconductance ⁴	V _{DS} =10V, I _D =20A	-	76	-	S
Ciss	Input Capacitance	V _{DS} =50V, V _{GS} =0V, f=1MHz	-	9030	-	pF
Coss	Output Capacitance		-	1505	-	
Crss	Reverse Transfer Capacitance		-	40	-	
R _g	Gate Resistance	f =1MHz	-	2.3	-	Ω
Q _g	Total Gate Charge	V _{GS} = 10V, V _{DS} = 50V, I _D =20A	-	150	-	nC
Q _{gs}	Gate-Source Charge		-	32.5	-	
Q _{gd}	Gate-Drain Charge		-	49	-	
td(on)	Turn-on Delay Time	V _{GS} =10V, V _{DD} =50V, R _G = 3Ω, I _D = 20A	-	27	-	ns
t _r	Rise Time		-	78.5	-	
td(off)	Turn-off Delay Time		-	110	-	
t _f	Fall Time		-	86	-	
trr	Body Diode Reverse Recovery Time	I _F = 20A, dI/dt=100A/μs	-	88	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	220	-	nC
VSD	Diode Forward Voltage ⁴	I _D = 20A, V _{GS} =0V	-	-	1.2	V
IS	Continuous Source Current T _C =25°C		-	-	220	A

Notes:

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is V_{DD}=50V, V_{GS}=10V, L=0.5mH, I_{AS}=54A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

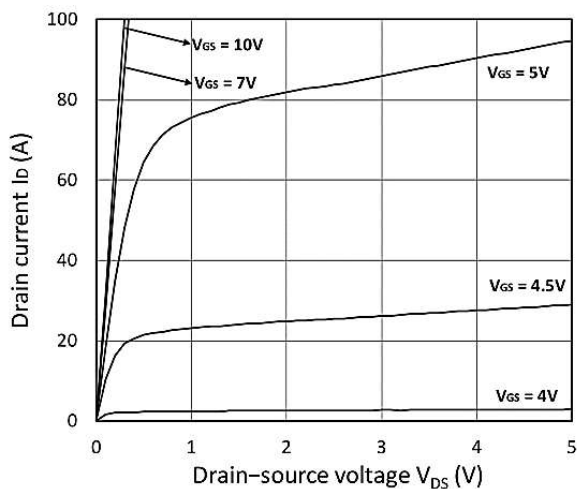


Figure 1. Output Characteristics

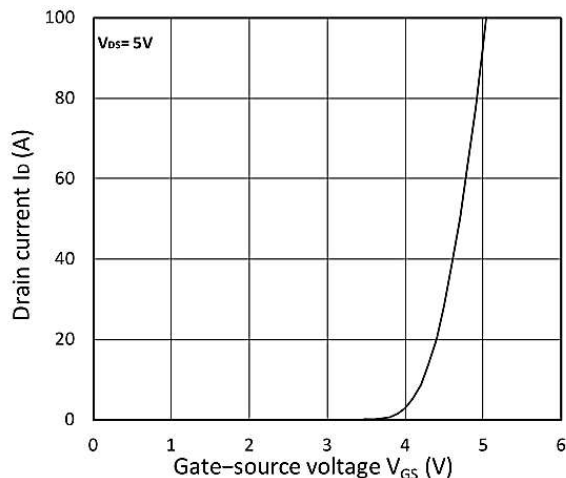


Figure 2. Transfer Characteristics

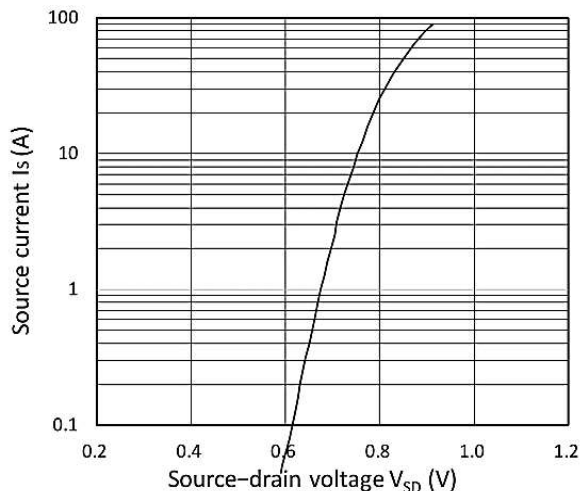


Figure 3. Forward Characteristics of Reverse

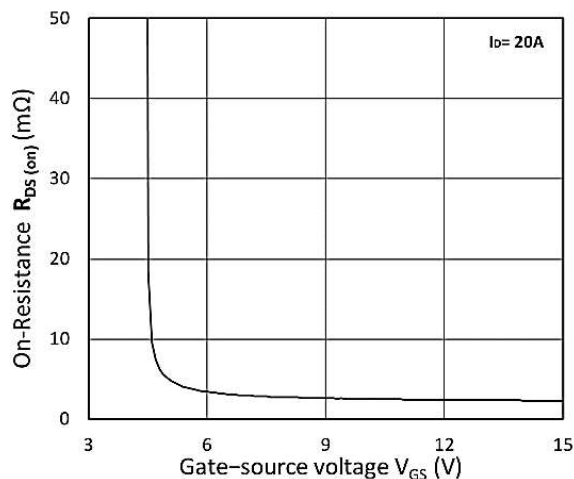


Figure 4. R_DS(ON) vs. V_GS

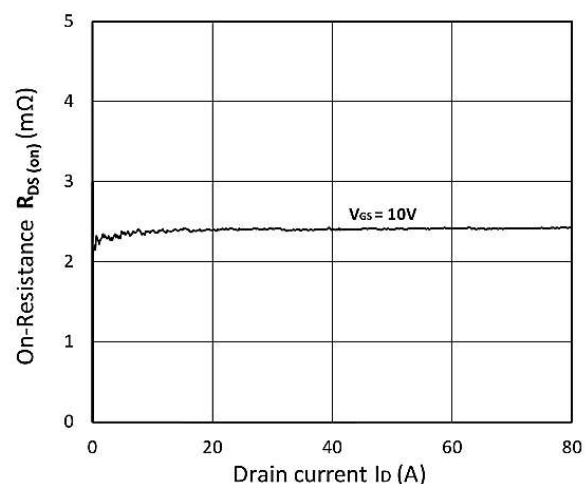


Figure 5. R_DS(ON) vs. I_D

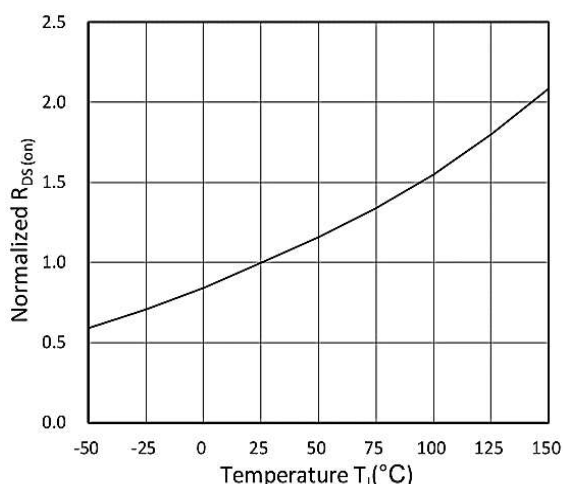


Figure 6. Normalized R_DS(on) vs. Temperature

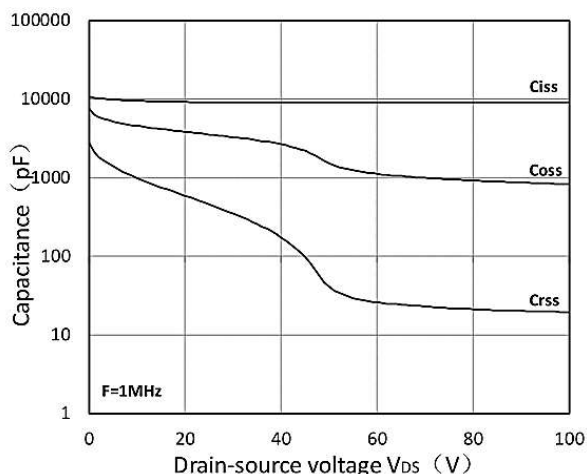


Figure 7. Capacitance Characteristics

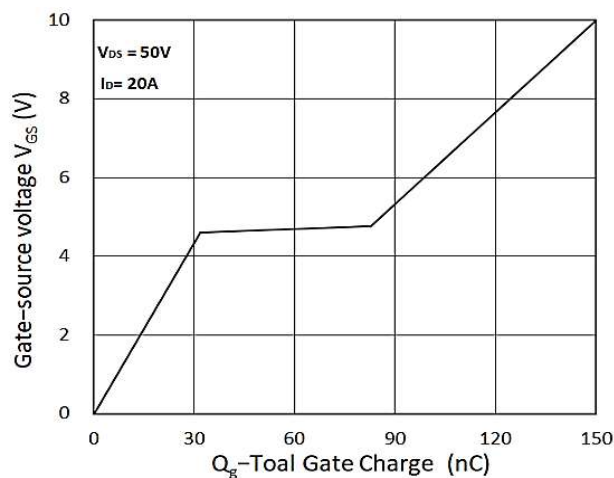


Figure 8. Gate Charge Characteristics

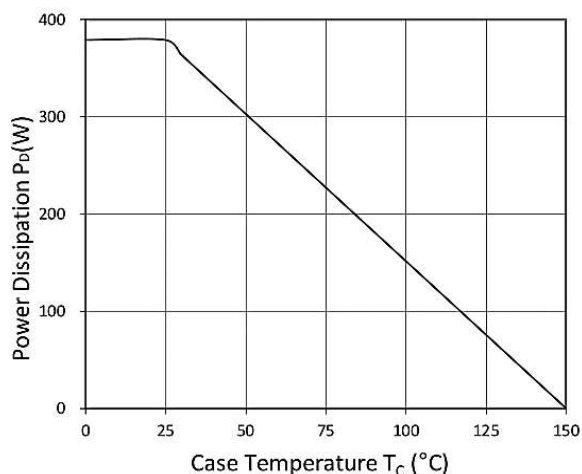


Figure 9. Power Dissipation

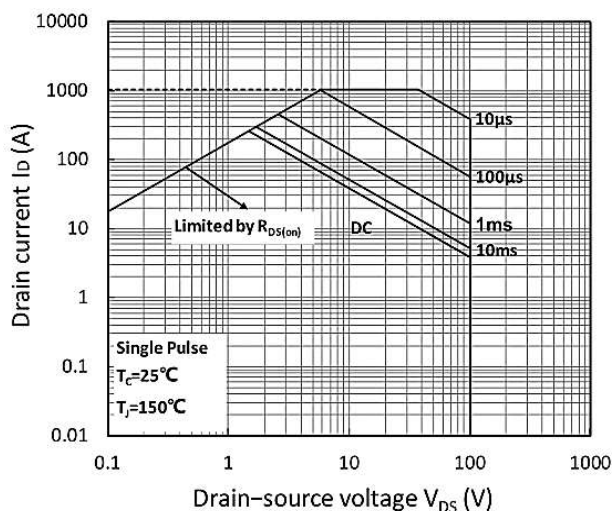


Figure 10. Safe Operating Area

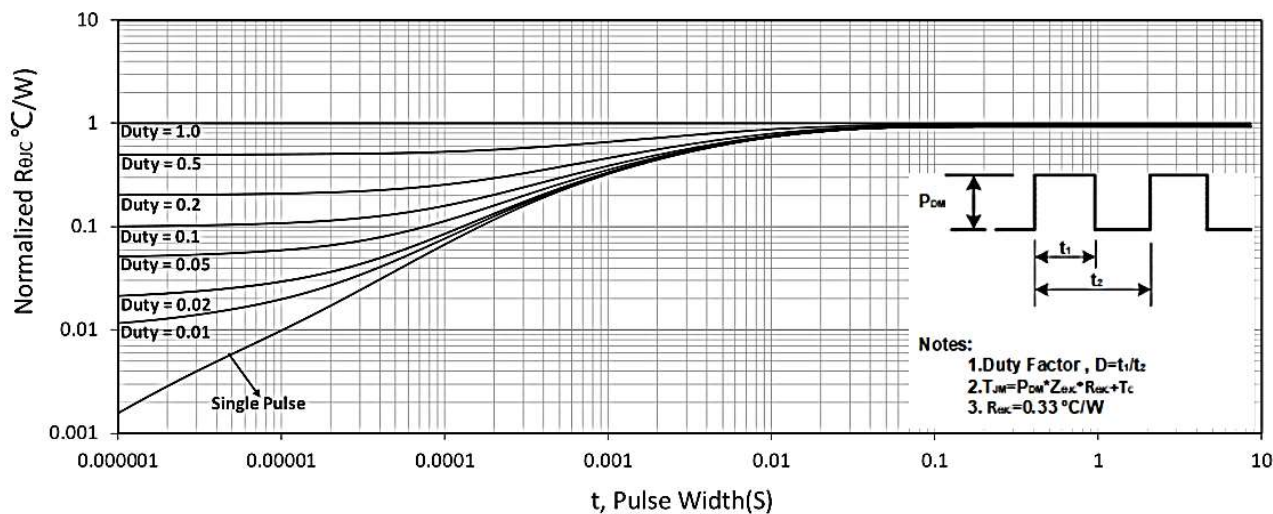
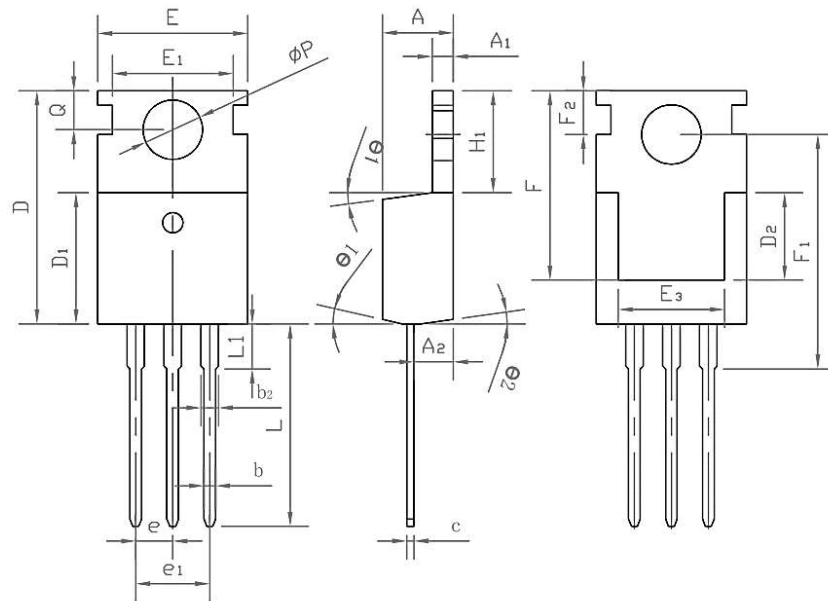


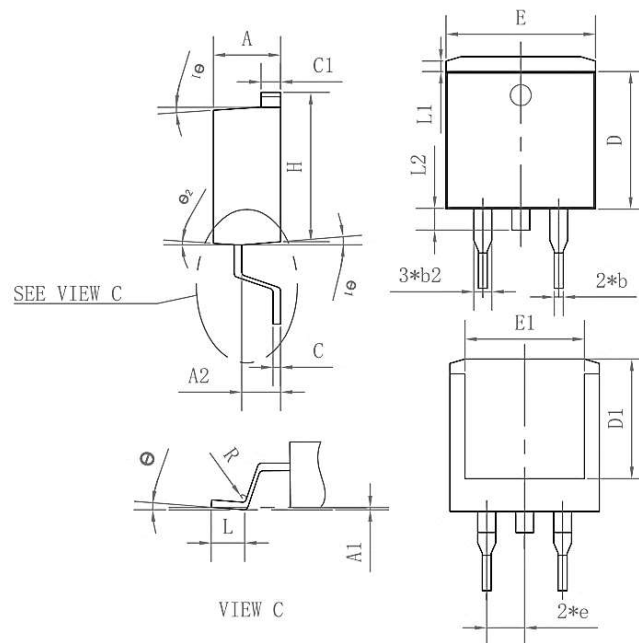
Figure 11. Normalized Maximum Transient Thermal Impedance

Package Mechanical Data-TO-220-3L



Symbol	Common		
	mm		
	Mim	Nom	Max
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b2	1.17	1.27	1.50
D	0.40	0.50	0.65
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	-	8.70	-
E2	9.63	10.00	10.35
E3	7.00	8.00	8.40
e	0.37		
e1	0.10		
H1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	-	3.10	3.40
Φp	3.45	3.60	3.75
Q	2.60	2.80	3.00
Q1	4°	7°	10°
Q2	0°	3°	6°
F	13.30	13.50	13.70
F1	15.50	15.90	16.30
F2	2.80	3.00	3.20

Package Mechanical Data-TO-263-2L



Symbol	Common		
	mm		
	Mim	Nom	Max
A	4.35	4.47	4.60
A1	0.09	0.10	0.11
A2	2.30	2.40	2.70
b	0.70	0.80	1.00
b2	1.25	1.36	1.50
C	0.45	0.50	0.65
C1	1.29	1.30	9.40
D	9.10	9.20	9.30
D1	7.90	8.00	8.10
E	9.85	10.00	10.20
E1	7.90	8.00	8.10
H	15.30	15.50	15.70
e	-	2.54	-
L	2.34	2.54	2.74
L1	1.00	1.10	1.20
L2	1.30	1.40	1.50
R	0.24	0.25	0.26
θ	0°	4°	8°
θ1	4°	7°	10°
θ2	0°	3°	6°

Edition	Date	Change
REV1.0	2022/5/5	Initial release