650, 10A, 0.8Ω N-Channel MOSFETs

Features

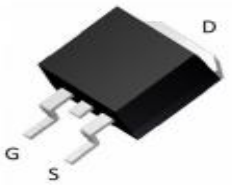
- Low Gate Chargea
- Excellent $R_{DS(ON)}$
- Great current Capability
- Green product RoHS compliant

Product Summary

RoHS

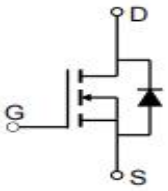
V_{DS}	650	V
$V_{GS(th)\_Typ}$	3.7	V
$R_{DS(ON)\_Typ}$ (@ V_{GS} =10V)	0.8	Ω
I_D (at V_{GS} =10V) (1)	10	A

TO-220C top view



TO-263 top view

TO-220F top view



Schematic Diagram

Type	Package	Marking	Outline	Media	Quantity(pcs)
10N65	TO-220C	-	-	Tube	50
10N65	TO-263	-	Tape	13”Reel	800
10N65	TO-220F	-	-	Tube	50

Absolute Maximum Ratings(T_J=25℃ unless otherwise noted)

Parameter	Symbol	SDM4N65AC/Y	SDM4N65AF	Unit
Drain-Source Voltage	V_{DS}	650		V
Gate-Source Voltage	V_{GS}	±30		V
Continuous Drain Current(1)	T_C=25℃	10	10*	A
	T_C=100℃	6.4	6.4*	A
Pulsed Drain Current(2)	I_{DM}	40		A
Avalanche Energy(3)	E_{AS}	446		mJ
Power Dissipation(4)	T_C=25℃	278	52	W
	T_C=100℃	111	21	
Body-Diode Continuous Current	I_S	10		A
Avalanche Current(3)	I_{AS}	10.7		A
Junction and Storage Temperature Range	T_{STG},T_J	-55 to 150		℃
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	45	55	℃/W
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.45	0.24	℃/W

Electrical Characteristics(Tj=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	650	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V,V_{GS}=0V,T_J=25℃	-	-	1	μA
		V_{DS}=650V,V_{GS}=0V,T_J=55℃	-	-	5	
Gate Body Leakage Current	I_{GSS}	V_{GS}=±30V,V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	3	3.7	5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=5A	-	0.8	1	Ω
Forward Trans conductance4	gfs	V_{DS}=5V,I_D=5A	-	9	-	S
Input Capacitance	C_{iss}	V_{GS}=0V,V_{DS}=25V, f=1.0MHz	-	1940	-	pF
Output Capacitance	C_{oss}		-	129	-	
Reverse Transfer Capacitance	C_{rss}		-	6.4	-	
Gate Resistance	R_g	V_{GS}=0V,V_{DS}=0V, f=1.0MHz	-	1.9	-	Ω
Total Gate Charge	Q_g	V_{DS}=520V,I_D=10A, V_{GS}=10V	-	33.1	-	nC
Gate-Source Charge	Q_{gs}		-	13.1	-	
Gate-Drain Charge	Q_{gd}		-	8.7	-	
Turn-on Delay Time	$T_{d(on)}$	R_G=25Ω,V_{DS}=250V, I_D=10A	-	37	-	nS
Turn-on Rise Time	t_r		-	65	-	
Turn-Off Delay Time	$T_{d(off)}$		-	53	-	
Turn-Off Fall Time	T_f		-	31	-	
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=10A	-	0.8	1.2	V
Body Diode Reverse Recovery Time	Trr	V_R=400V, I_F=10A, di/dt=100A/μs	-	729	-	Ns
Body Diode Reverse Recovery Charge	Qrr		-	9.3	-	μC

Note :

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

Typical Electrical and Thermal Characteristics

Figure 1: Saturation Characteristics

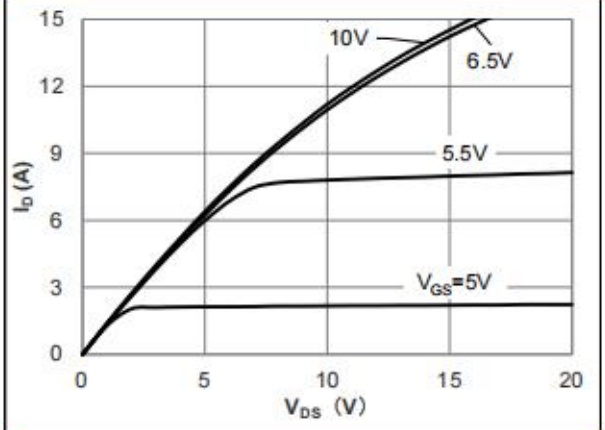


Figure 2: Transfer Characteristics

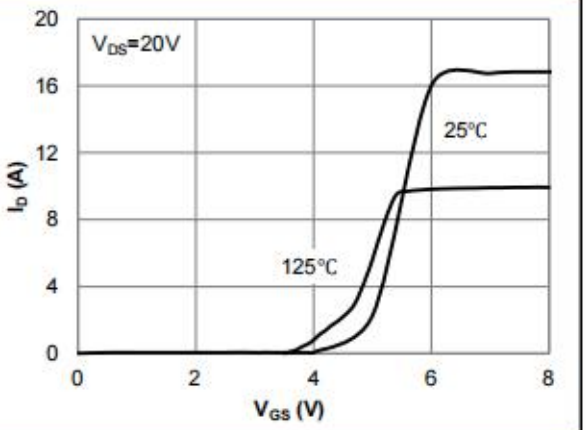


Figure 3: $R_{DS(ON)}$ vs. Drain Current

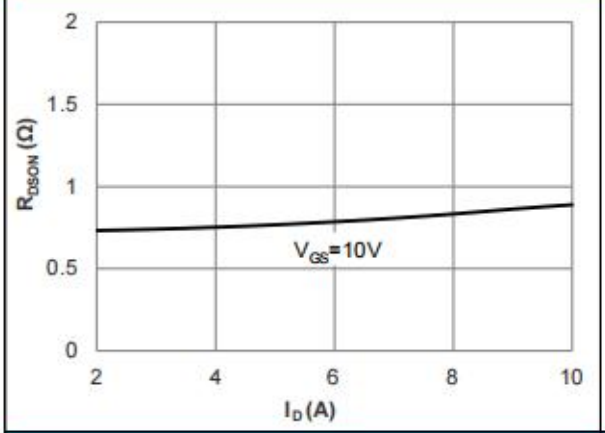


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

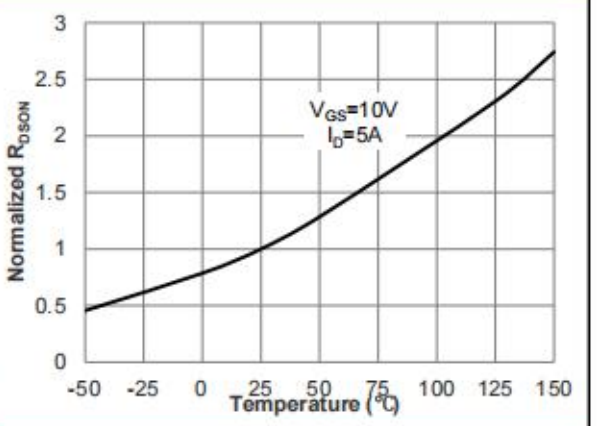


Figure 5: $R_{DS(ON)}$ vs. Gate-Source Voltage

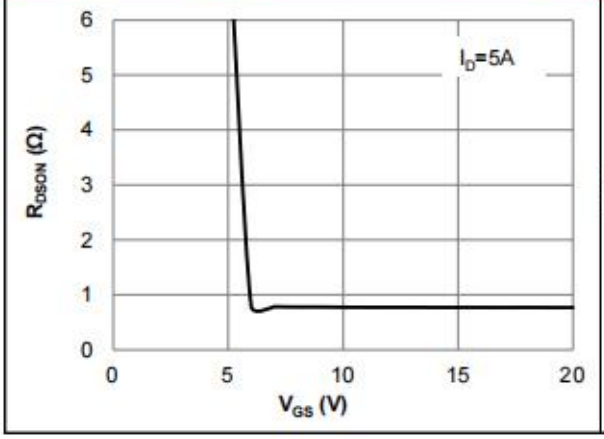
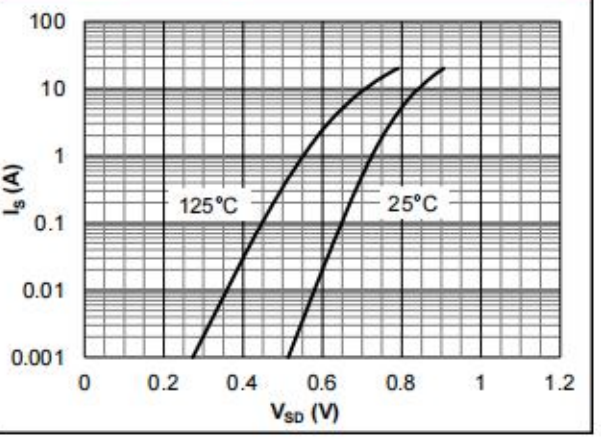


Figure 6: Body-Diode Characteristics



Typical Electrical and Thermal Characteristics

Figure 7: Gate-Charge characteristics

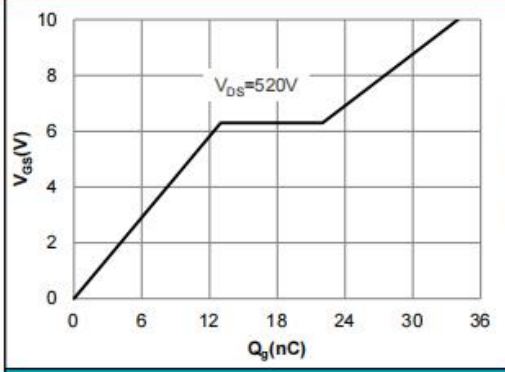


Figure 8: Capacitance characteristics

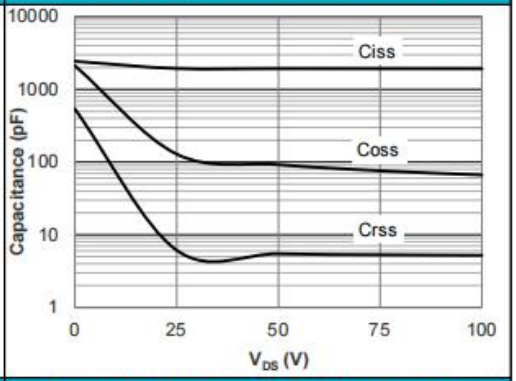


Figure 9: Current De-rating

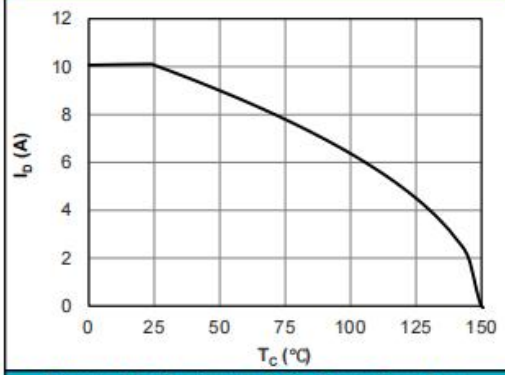


Figure 10: Maximum Safe Operating Area (TO-220C/TO-263)

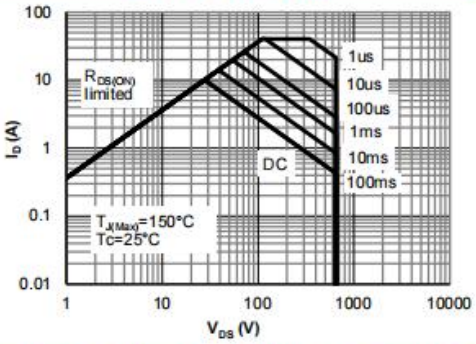


Figure 11: Maximum Safe Operating Area (TO-220F)

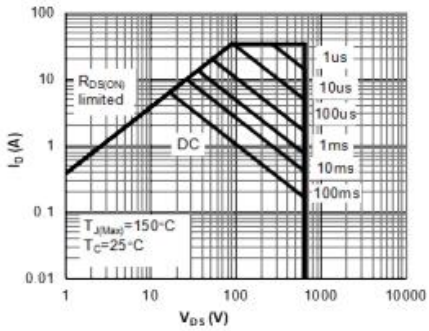


Figure 12: Normalized Maximum Transient Thermal Impedance(TO-220F)

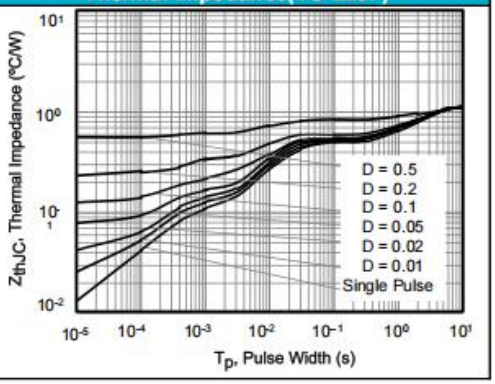
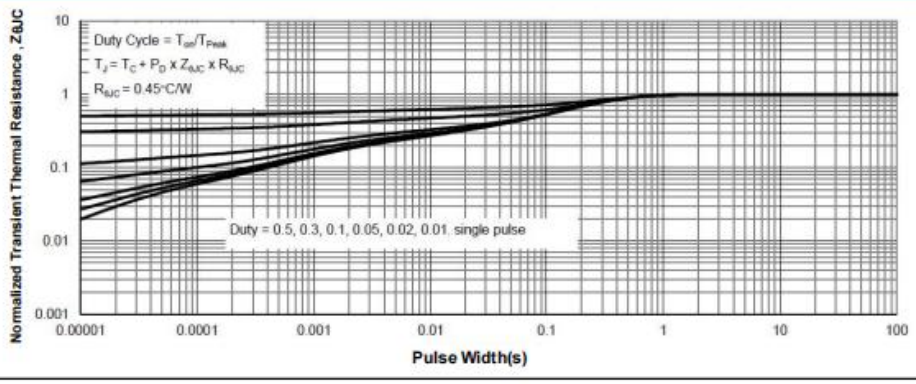
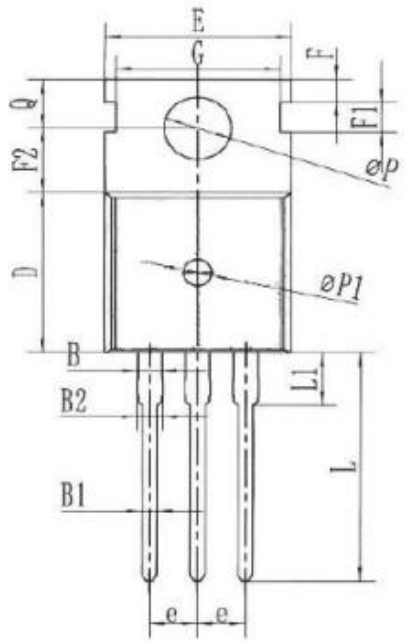


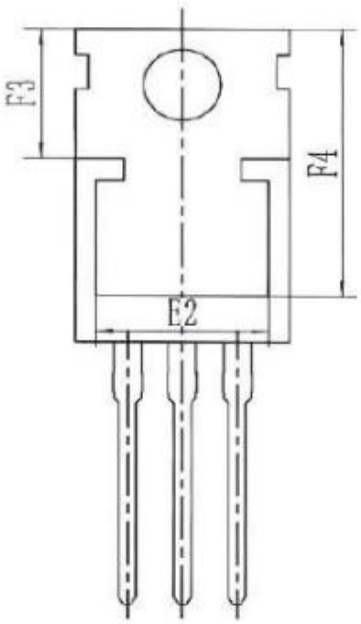
Figure 13: Normalized Maximum Transient Thermal Impedance(TO-220C/TO-263)



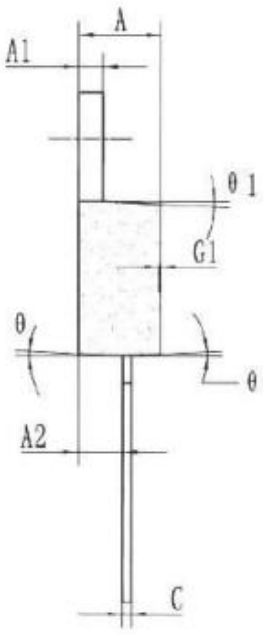
TO-220C Package Information



TOP VIEW



BOTTOM VIEW

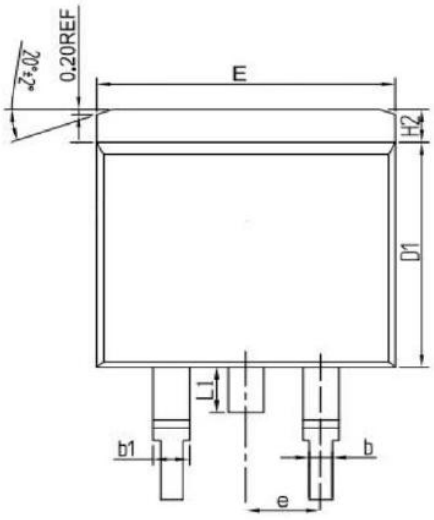


SIDE VIEW

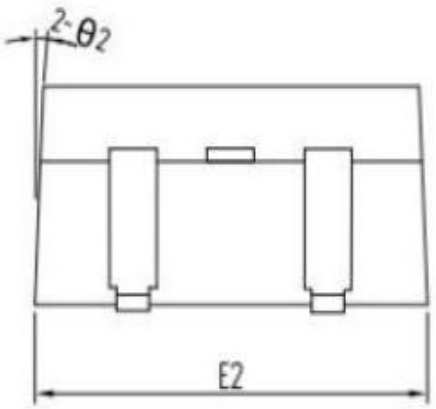
4

SYMBOL	MILLIMETER		
	MIN	TYP.	MAX
A	4.40	4.50	4.60
A1	1.25	1.30	1.35
A2	2.30	2.40	2.50
B	1.22	1.27	1.32
B1	0.70	0.80	0.90
B2	1.32	1.37	1.42
C	0.45	0.50	0.55
D	9.10	9.20	9.30
E	9.70	9.90	10.1
E1	9.90	10.00	10.10
E2	7.80	8.00	8.20
e	2.54 BSC		
F	1.22	1.30	1.38
F1	1.60	1.70	1.80
F2	3.60	3.70	3.80
F3	6.30	6.50	6.70
F4	13.10	13.40	13.70
G	8.60	8.70	8.80
G1	0.05	0.10	0.15
L	12.80	13.10	13.40
L1	2.80	3.00	3.20
ΦP	3.50	3.60	3.70
Q	2.70	2.80	2.90

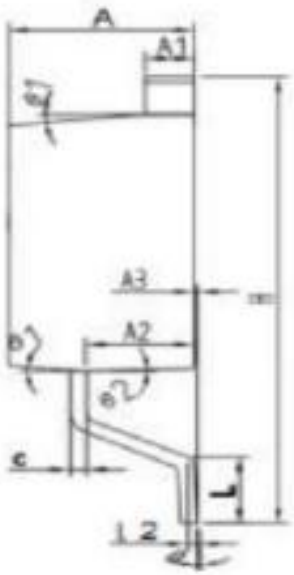
TO-263 Package Information



TOP VIEW



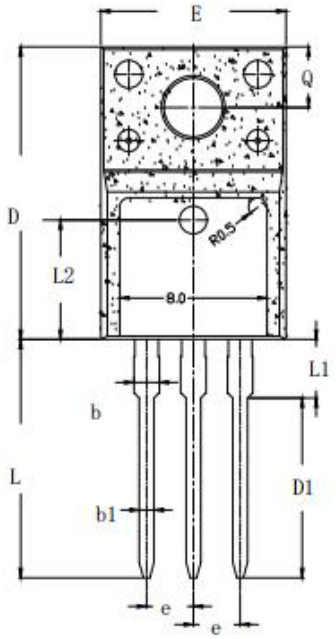
SIDE VIEW



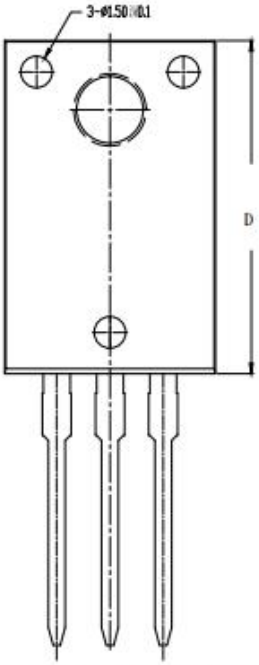
SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	TYP.	MAX
A	4.40	4.57	4.70
A1	1.22	1.27	1.32
A3	0.00	-	0.10
b	0.74	0.78	0.87
c	0.34	0.38	0.47
E	9.93	10.03	10.13
e	2.54BSC		
H	14.7	15.1	15.5
L	2.00	2.3	2.6

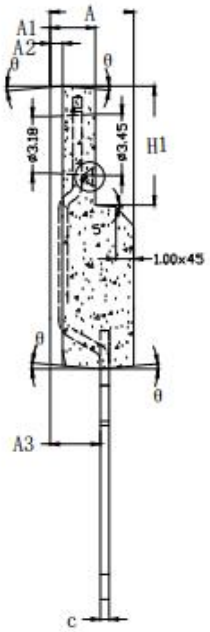
TO-220F Package Information



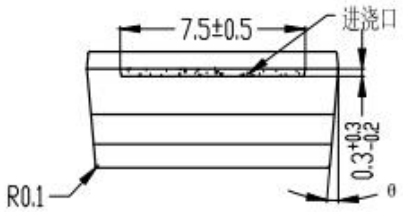
TOP VIEW



BOTTOM VIEW



SIDE VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	TYP.	MAX
A	4.60	4.70	4.80
A1	2.39	2.54	2.69
A2	0.60	0.70	0.80
A3	2.81	2.82	2.83
b	1.61	1.62	1.63
b1	-	0.80	-
c	-	0.50	-
D	15.72	15.87	16.02
D1	-	9.75	-
E	9.91	10.06	10.21
e	2.54 BSC		
H1	6.67	6.68	6.69
L	12.90	12.93	12.96
L1	-	3.18	-
L2	6.47 REF		
Q	-	3.30	-
θ1	1°	3°	5°