BMx65N065UC1

Super Junction Power MOSFET

650 V, 55 A, 65 mΩ

Description

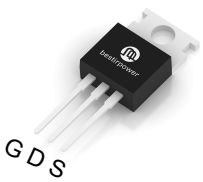
BMx65N065UC1 is power MOSFET using bestirpower's advanced super junction technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

Features

$BV_{DSS,\ Tc=25℃}$	$I_{D,\ Tc=25℃}$	$R_{DS(on),max.\ Tc=25℃}$	$Q_{g,typ}$
650 V	**55 A**	**65 mΩ**	**73 nC**

- Ultra-fast body diode.
- Extremely low losses due to very low FOM Rdson*Qg and Eoss.
- Very high commutation ruggedness.

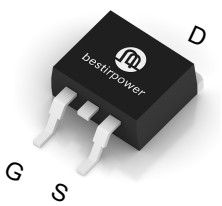
TO-220



TO-220F

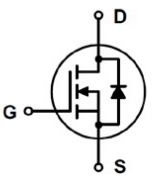
TO-247

TO-263



Applications

- PC power.
- AC/DC power supply.
- Telecom/Server.
- Solar Invertor.
- Super charger for automobiles



Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method
BMP65N065UC1	BMP65N065UC1	TO220	Tube
BMF65N065UC1	BMF65N065UC1	TO220F	Tube
BMB65N065UC1	BMB65N065UC1	TO263	Tape & Reel
BMW65N065UC1	BMW65N065UC1	TO247	Tube

Absolute Maximum Ratings (T_C = 25℃ unless otherwisenoted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage[1]		650	V
V_{GSS}	Gate to Source Voltage		±30	V
I_D	Drain Current[2]	V_{GS} = 10 V, (T_C= 25℃)	55	A
		V_{GS} = 10 V, (T_C= 100℃)	35	
I_{DM}	Drain Current	Pulsed	165	A
P_D	Power Dissipation For TO-220F		34	W
	Power Dissipation For TO-220, TO-247, TO-263		500	
E_{AS}	Single Pulsed Avalanche Energy[3]		1000	mJ
I_{AR}	Avalanche current, repetitive		6	A
dv/dt	MOSFET dv/dt ruggedness	V_{DS} =0...480V	50	V/ns
	Diode Recovery dv/dt[4]	V_{DS}=0...400V, I_{SD}<=I_S, Tj=25°C	50	V/ns
dif/dt	Maximum diode commutation speed[4]	V_{DS}=0...400V, I_{SD}<=I_S, Tj=25°C	500	A/ns
I_S	Continuous diode forward current T_C=25°C		55	A
$I_{S,pulse}$	Diode pulse current[2]		165	A
T_{STG}	Storage Temperature Range		-55 to 150	℃
T_J	Maximum Operating Junction Temperature		150	℃
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 10		260	℃

1) limited by T_j max. Maximum duty cycle D=0.75.
2) Pulse width t_p limited by T_j,max.
3) V_{DD}=50V, R_G=25Ω, Starting T_j=25°C.
4) V_{DClink}=400V; $V_{DS,peak}$<$V_{(BR)DSS}$; identical low side and high side switch with identical R_G.

Thermal Characteristics (FullPAK) TO220F

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, max	3.67	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, max	62.5	

Thermal Characteristics (Non FullPAK) TO220, TO247, TO263

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, max	0.25	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, max	62	

Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0 V, I_D = 1mA	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V T_J=25°C	-	-	10	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS} = ±30 V, V_{DS} = 0 V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 1mA	2.8	3.8	4.8	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 23.5A T_J=25°C	-	58	65	mΩ
R_G	Gate Resistance	V_{DD} = 0V, V_{GS}= 0V, f = 1.0MHz	-	3.5	-	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=100V, f=250kHz	-	3990	-	pF
C_{oss}	Output Capacitance		-	120	-	pF
C_{rss}	Reverse Transfer Capacitance		-	5	-	pF
$C_{o(er)}$	Effective output capacitance, energy related[1]	V_{GS}=0V, V_{DS}= 0 to 400V	-	125	-	pF
$C_{o(tr)}$	Effective output capacitance, time related[2]		-	637	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V, V_{DD} =400V, I_D =25A	-	73	-	nC
Q_{gs}	Gate to Source Charge		-	18	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	23	-	nC
$V_{plateau}$	Gate plateau voltage		-	4.5	-	V
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400V, I_D = 23A, V_{GS} = 10V	-	66	-	ns
t_r	Turn-On Rise Time		-	79	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	139	-	ns
t_f	Turn-Off Fall Time		-	12	-	ns
Reverse Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_F=23A, V_{GS} = 0V T_J=25°C	-	0.9	-	V
t_{rr}	Reverse Recovery Time	V_R = 400V, I_F =23A, di_F/dt = 100A/μs	-	165	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.9	-	μC
I_{rrm}	Peak Reverse Recovery Current		-	22	-	A

1) $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 400V.
2) $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 400V.

Typical Performance Characteristics

Figure 1: Transient Thermal Impedance For TO-220F

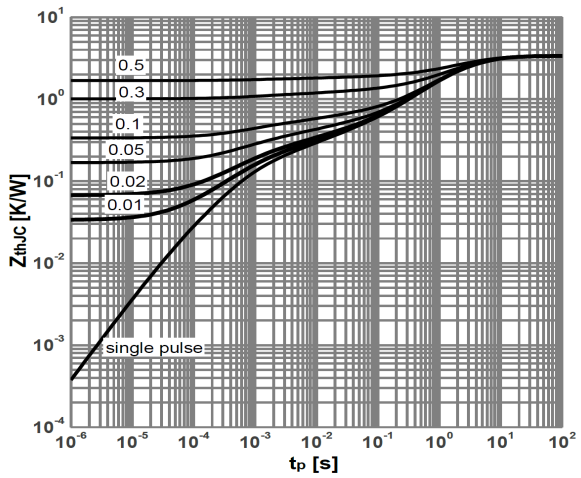


Figure 2: Power dissipation For TO-220F

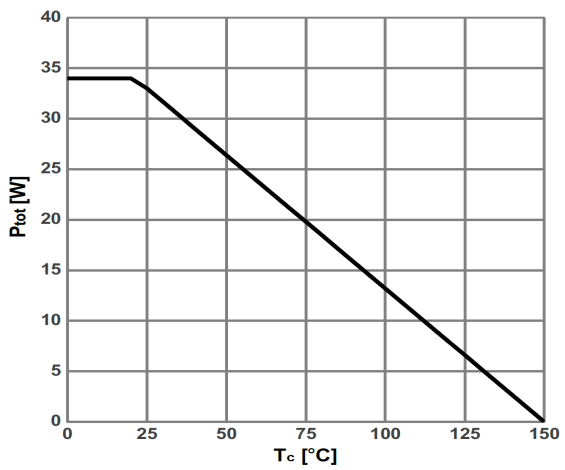


Figure 3. Transient Thermal Impedance For TO-220、TO-247、TO-263

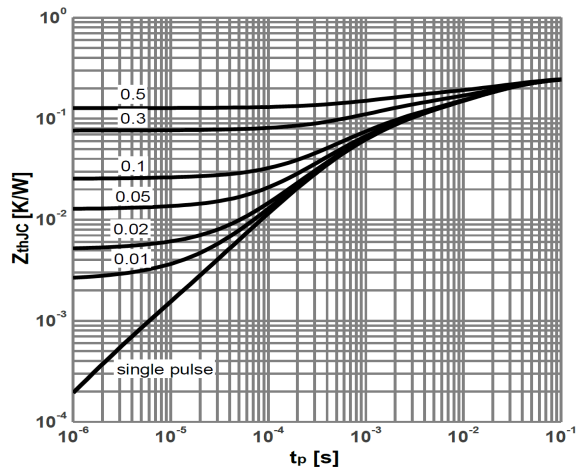


Figure 4. Power dissipation For TO-220、TO-247、TO-263

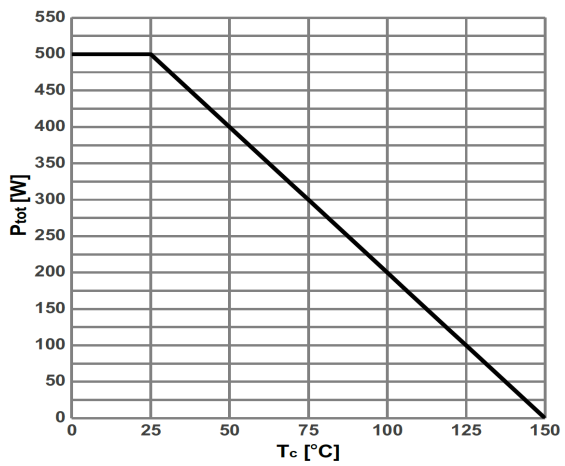


Figure 5: Safe operating area For TO-220、TO-247、TO-263

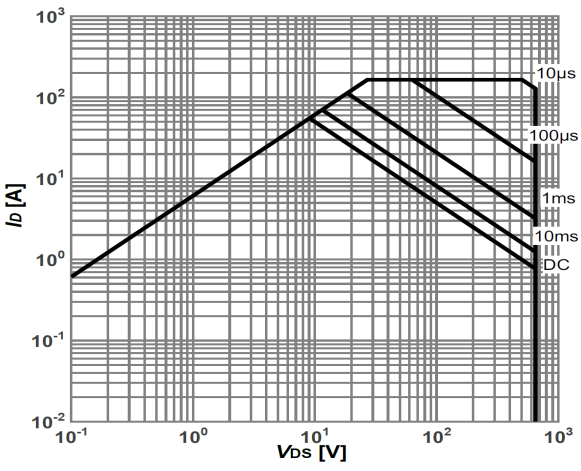
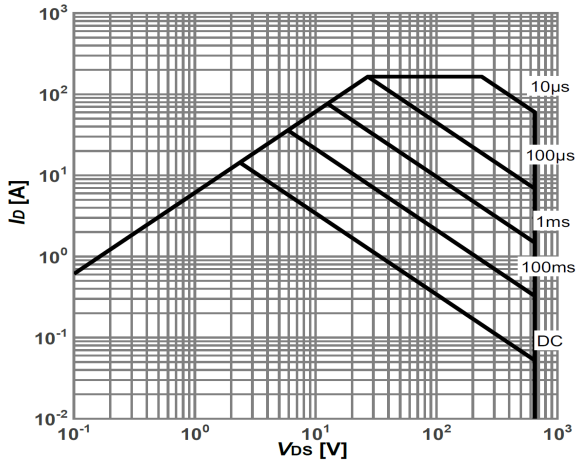


Figure 6: Safe operating area For TO-220F



Typical Performance Characteristics

Figure 7: Typ. output characteristics @ Tj=25°C

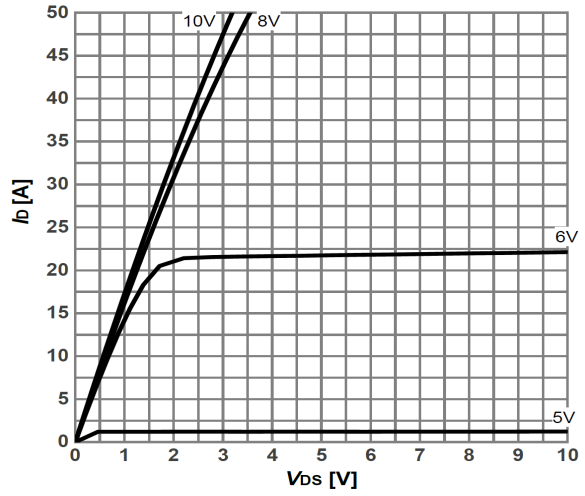


Figure 8: Typ. output characteristics @ Tj=125°C

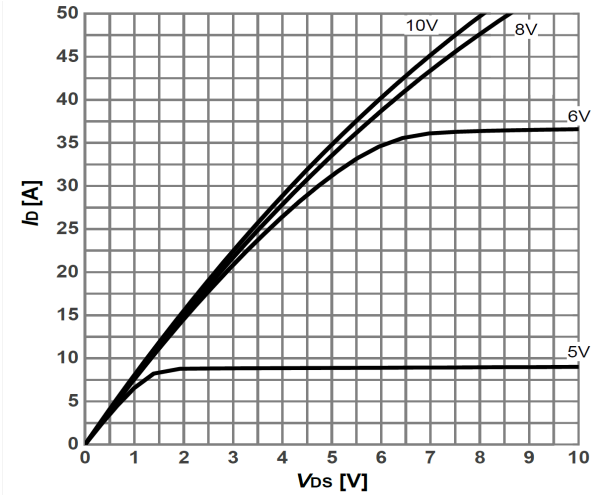


Figure 9: Typ. drain-source on-state resistance

$R_{DS}(on)=f(I_D)$; $Tj=25°C$; parameter: V_{GS}

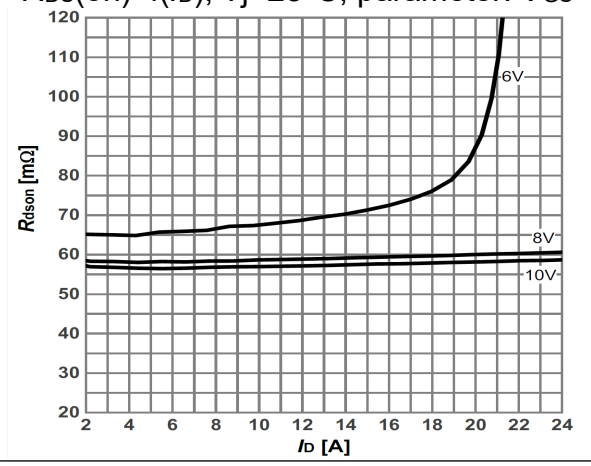


Figure 10: Drain-source on-state resistance

$R_{DS}(on)=f(T_j)$; $I_D=23.5A$; $V_{GS}=10V$

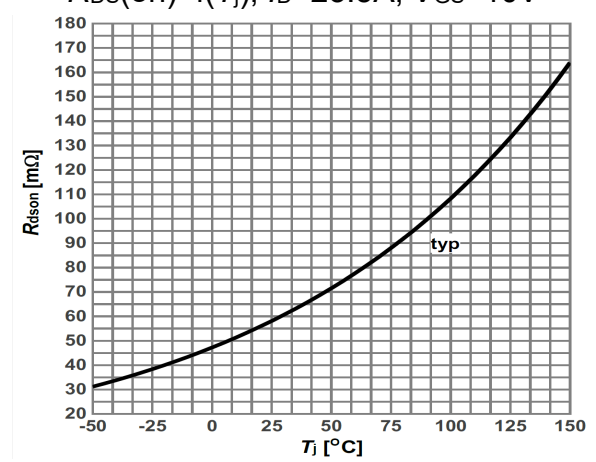


Figure 11: Breakdown Voltage vs Junction Temperature

$I_D=f(V_{GS})$; $V_{DS}=20V$; parameter: T_j

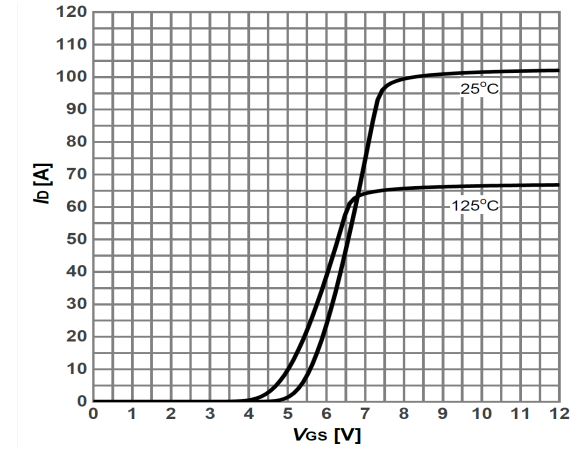
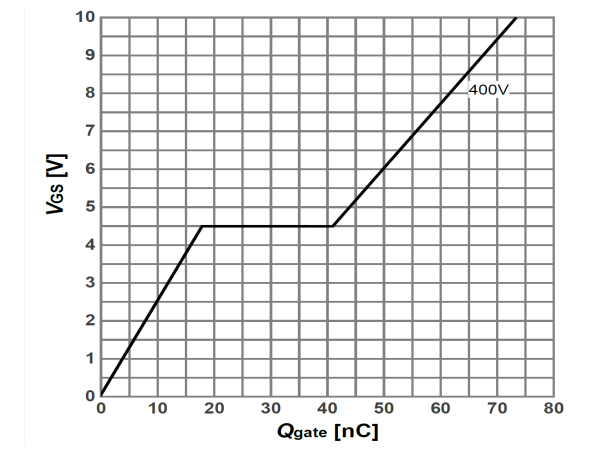


Figure 12: On-Resistance vs Temperature

$V_{GS}=f(Q_{gate})$; $I_D=25A$ pulsed; $V_{DS}=400V$



Typical Performance Characteristics

Figure 13: Forward characteristics of reverse diode

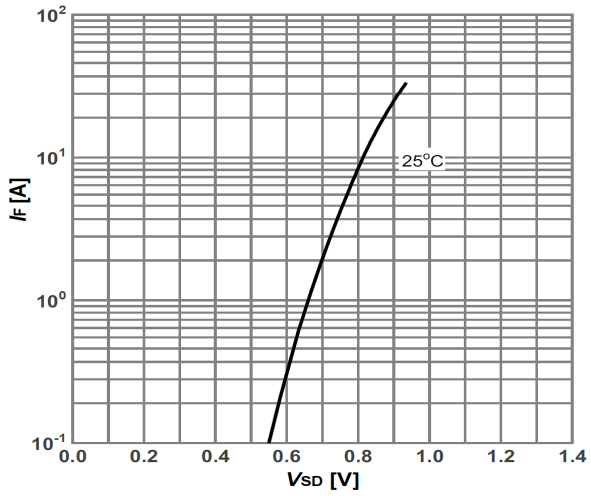


Figure 14: Drain-source breakdown voltage

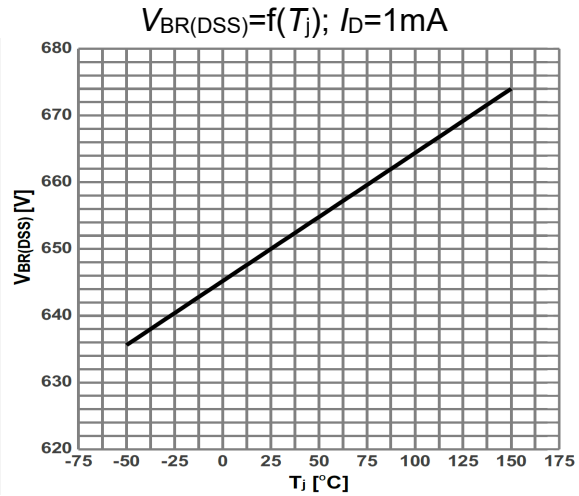


Figure 15: Maximum Drain Current

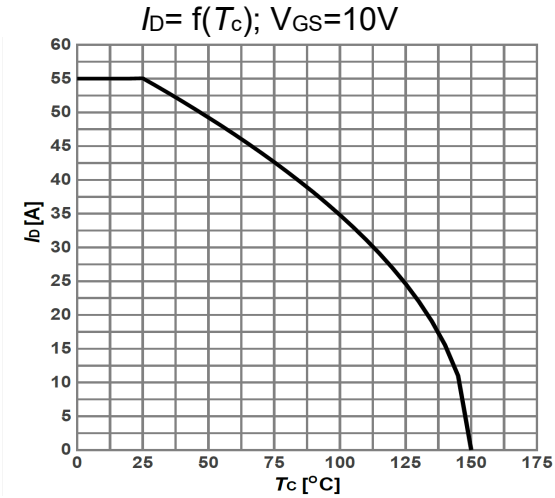


Figure 16: Typ. capacitances

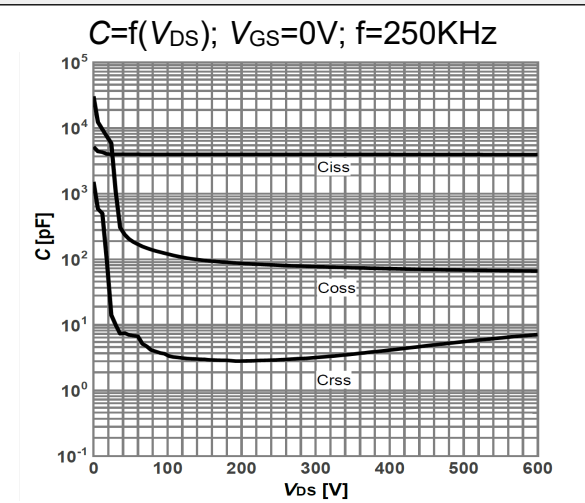
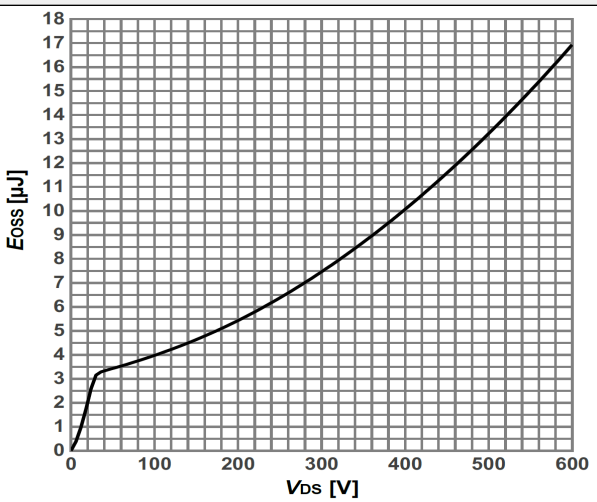


Figure 17: Typ. Coss stored energy



Test Circuits

Figure 18. Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

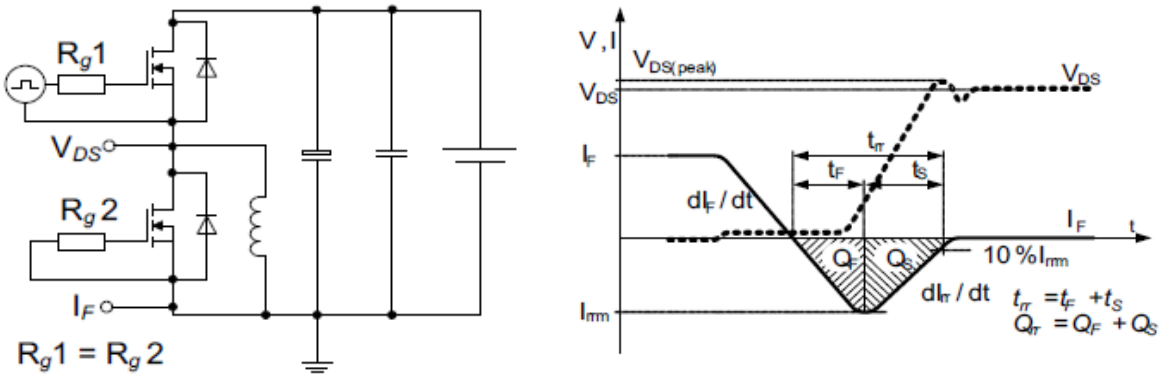


Figure 19. Switching Times

Switching times test circuit for inductive load and Switching times waveform

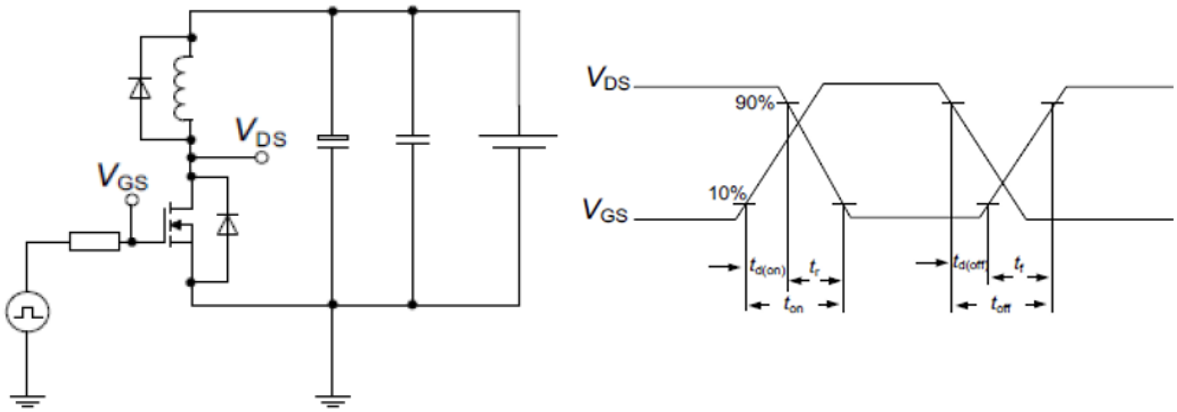
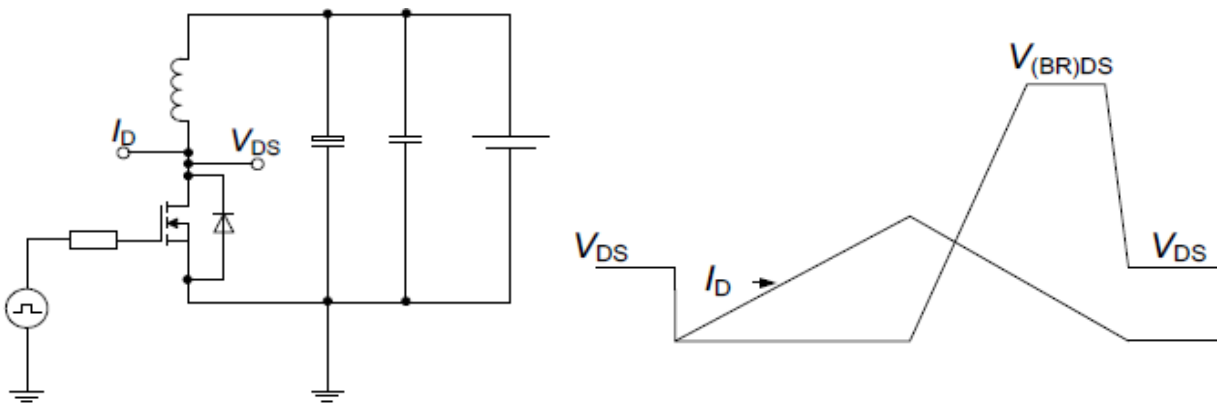


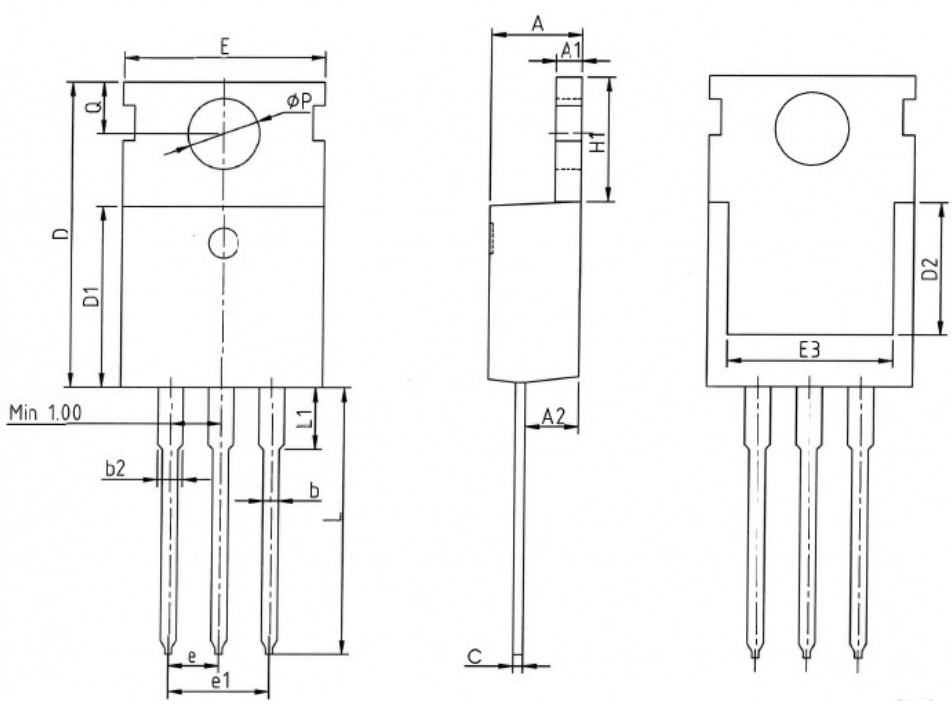
Figure 20. Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

TO-220

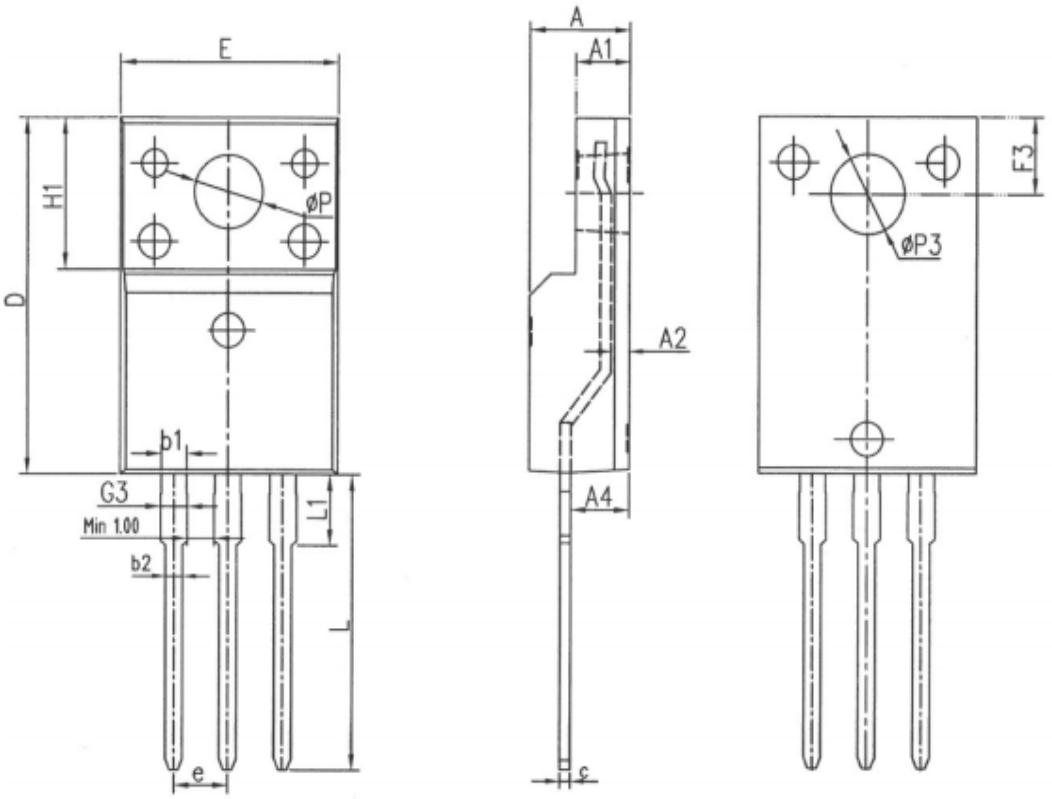


SYMBOL	MIN	NOM	MAX
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	6.30	7.10
E	9.70	10.00	10.30
E3	7.00	7.80	8.60
e		2.54 BSC	
e1		5.08 BSC	
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

* Dimensions in millimeters

Package Outlines

TO-220F



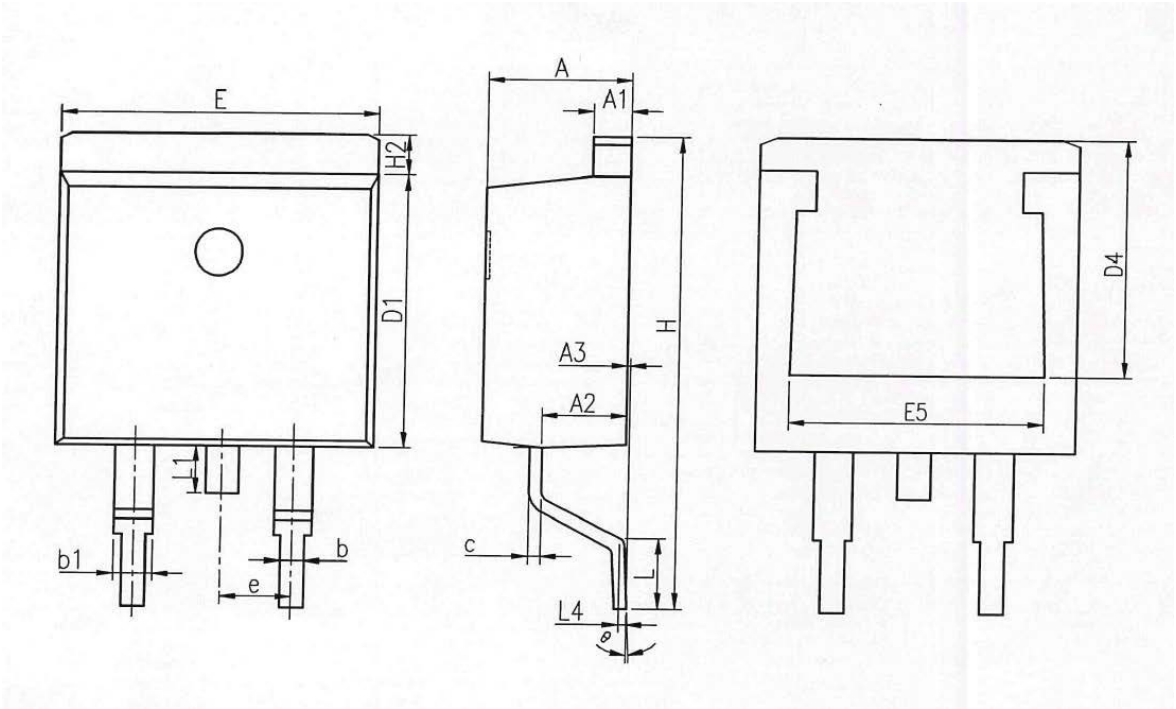
COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
E	10.00	10.20	10.40
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.65	0.85	1.30
A4	2.55	2.75	2.95
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
ΦP	3.183REF		
L	12.68	12.98	13.28
L1	3.25	3.45	3.65
ΦP3	3.45REF		
F3	3.10	3.30	3.50
G3	1.10	1.30	1.50
b1	1.05	1.20	1.35
b2	0.70	0.80	0.92

* Dimensions in millimeters

Package Outlines

TO-263



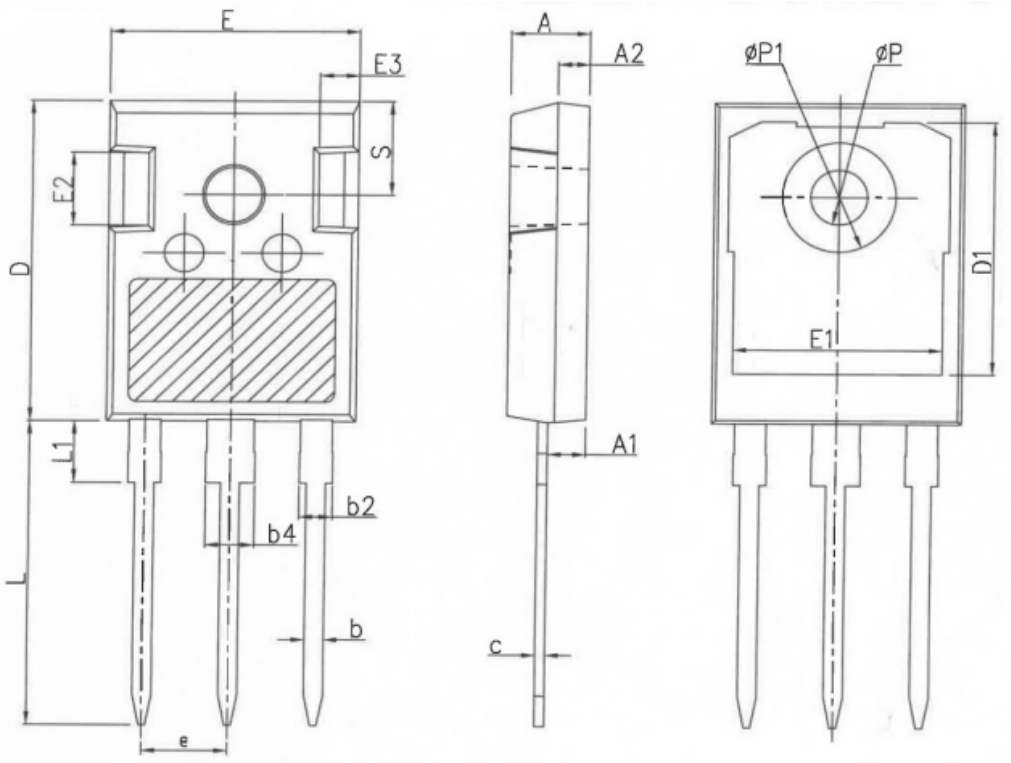
COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0.00	0.13	0.25
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D1	8.50	8.70	8.90
D4	6.60	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e		2.54 BSC	
H	14.70	15.10	15.50
H2	1.07	1.27	1.47
L	2.00	2.30	2.60
L1	1.40	1.55	1.70
L4		0.25 BSC	
θ	0°	5°	9°

* Dimensions in millimeters

Package Outlines

TO-247-3L



SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.29	2.42	2.54
A2	1.90	2.00	2.10
b	1.10	1.20	1.30
b1	1.91	2.06	2.20
b2	2.92	3.06	3.20
c	0.50	0.60	0.70
D	20.80	21.07	21.34
D1	17.43	17.63	17.83
E	15.75	15.94	16.13
E1	13.06	13.26	13.46
E2	4.32	4.58	4.83
e		5.45 BSC	
L	19.85	20.05	20.25
L1	4.05	4.27	4.49
ΦP	3.55	3.60	3.65
Q	5.59	5.89	6.19
S		6.15 BSC	

* Dimensions in millimeters

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