

BMF65N135UE1

Super Junction Power MOSFET

650 V, 30 A, 135 mΩ

Description

BMF65N135UE1 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.

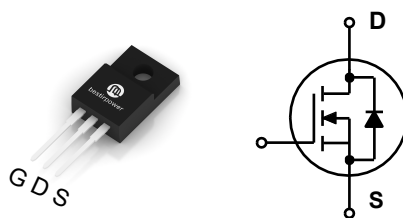
Applications

- PC power.
- Server power supply.
- Telecom.
- Solar inverter.
- Super charger for automobiles.

Features

$BV_{DSS} @ T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
700V	30 A	135 mΩ	57 nC

- Ultra-fast body diode.
- Extremely low losses due to very low FOM
- $R_{dson} \cdot Q_g$ and E_{oss} .
- Very high commutation ruggedness.



Absolute Maximum Ratings ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter		Value	Unit
V _{DSS}	Drain to Source Voltage		650	V
V _{GSS}	Gate to Source Voltage		±30	V
I _D	Drain Current	(T _C = 25°C)	30	A
		(T _C = 100°C)	18	
I _{DM}	Pulsed Drain Current ⁽¹⁾		90	A
E _{AS}	Single Pulsed Avalanche Energy ⁽²⁾		151	mJ
I _{AR}	Avalanche Current		5.5	A
dv/dt	MOSFET dv/dt ruggedness, V _{DS} = 0...480V ⁽³⁾		50	V/ns
P _D	Power Dissipation	(T _C = 25°C)	35	W
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	3.57	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	64	

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$	-	-	3.5	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm 30\text{ V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	3.0	-	5.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 25^\circ\text{C}$	-	118	135	mΩ

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 100\text{ V},$ $f = 1.0\text{ MHz}$	-	2421	-	pF
C_{oss}	Output Capacitance		-	87	-	pF
C_{rss}	Reverse transfer capacitance		-	2	-	pF
Q_g	Total Gate Charge at 10 V	$V_{DD} = 520\text{ V}, I_D = 30\text{ A},$ $V_{GS} = 10\text{ V}$	-	57	-	nC
Q_{gs}	Gate to Source Charge		-	15	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	20	-	nC
R_G	Gate resistance	$f = 1\text{ MHz}, \text{open drain}$	-	1.5	-	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400\text{ V}, I_D = 30\text{ A},$ $R_G = 25\text{ }\Omega$	-	26	-	ns
t_r	Turn-On Rise Time		-	45	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	174	-	ns
t_f	Turn-Off Fall Time		-	67	-	ns

Source-Drain Diode Characteristics

V_{SD}	Diode Forward Voltage	$T_J = 25^\circ\text{C}, I_{SD} = 15\text{ A}, V_{GS} = 0\text{ V}$	-	1.0	1.5	V
t_{rr}	Reverse Recovery Time	$V_R = 400\text{ V}, I_F = I_S,$ $di_F/dt = 100\text{ A}/\mu\text{s}$	-	209	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.3	-	μC
I_{rrm}	Peak reverse recovery current		-	12.6	-	A

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 10\text{ mH}, V_{DD} = 50\text{ V}, R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Identical low side and high side switch with identical R_G

Typical Performance Characteristics

Figure 1. Outout Characteristics

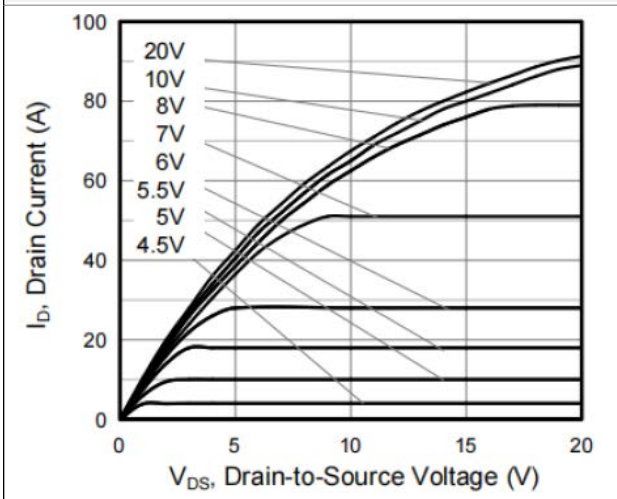


Figure 2. Transfer Characteristics

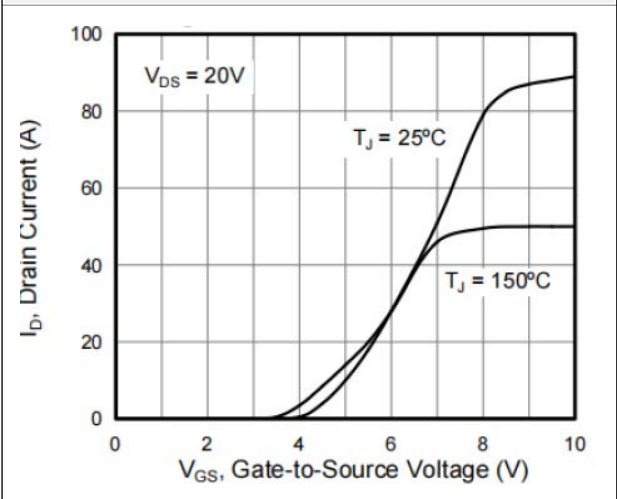


Figure 3. On-Resistance vs. Drain Current

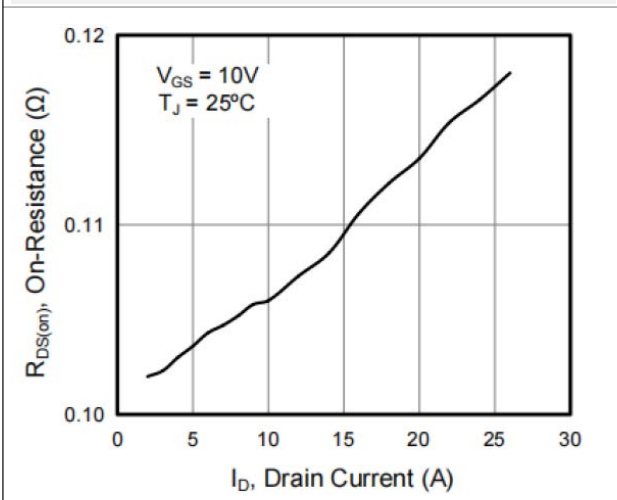


Figure 4. Capacitance

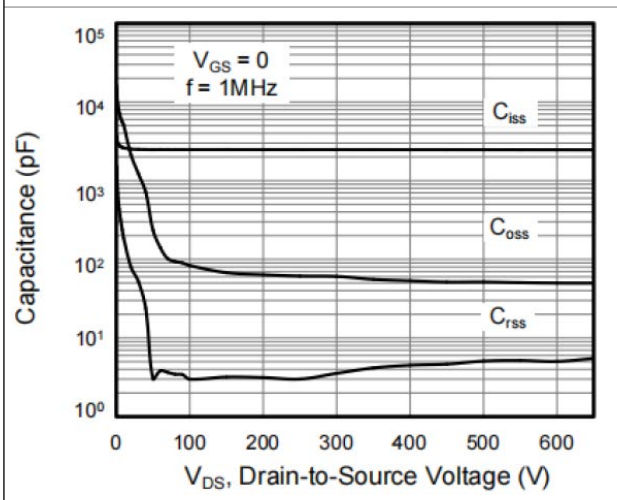


Figure 5. Gate Charge

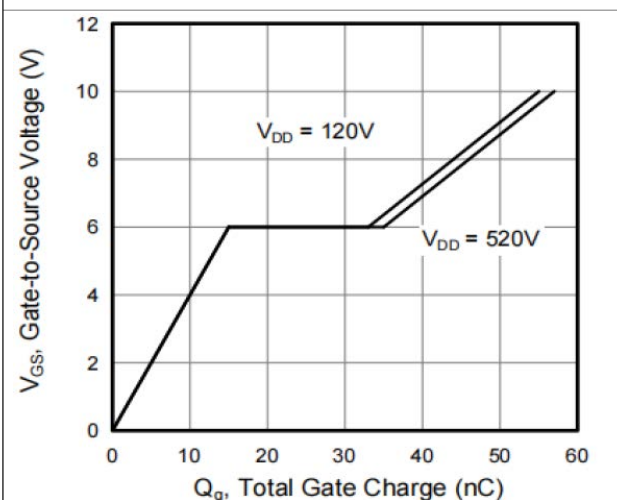
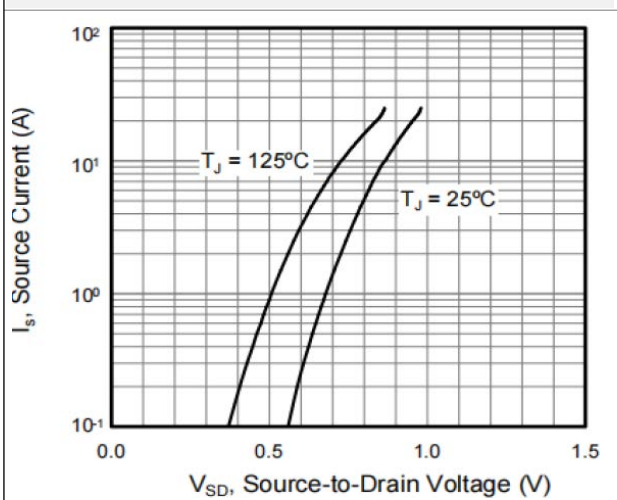


Figure 6. Body Diode Forward Voltage



Typical Performance Characteristics

Figure 7. On-Resistance vs. Temperature

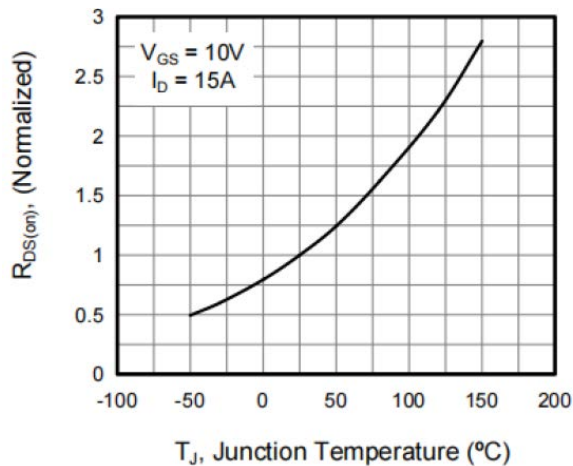


Figure 8. Breakdown voltage vs. Junction Temperature

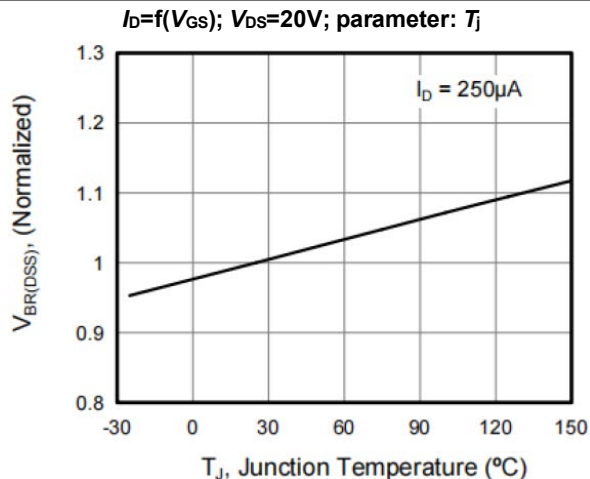


Figure 9. Transient Thermal Impedance For TO-220F

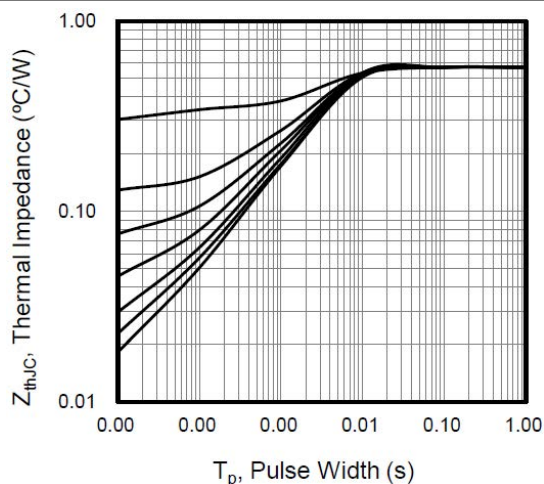


Figure 10. Safe Operation Area For TO-220F

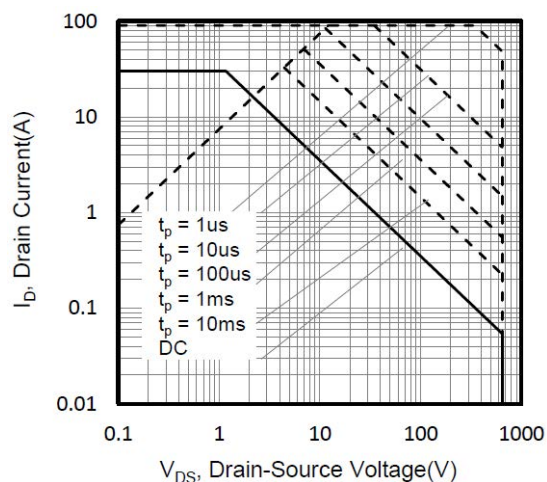
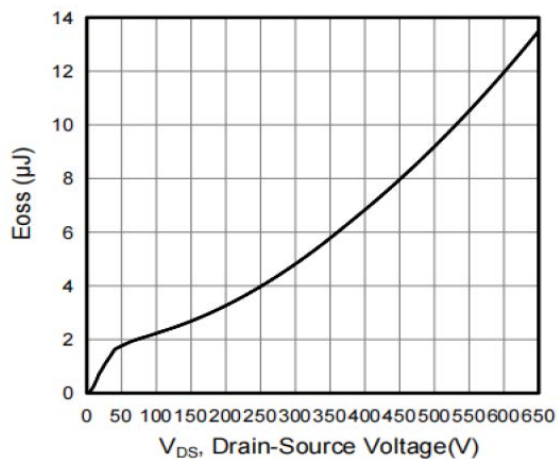


Figure 11. Typ. Coss Stored Energy



Test Circuits

Figure 12. Gate Charge Test Circuit and Waveform

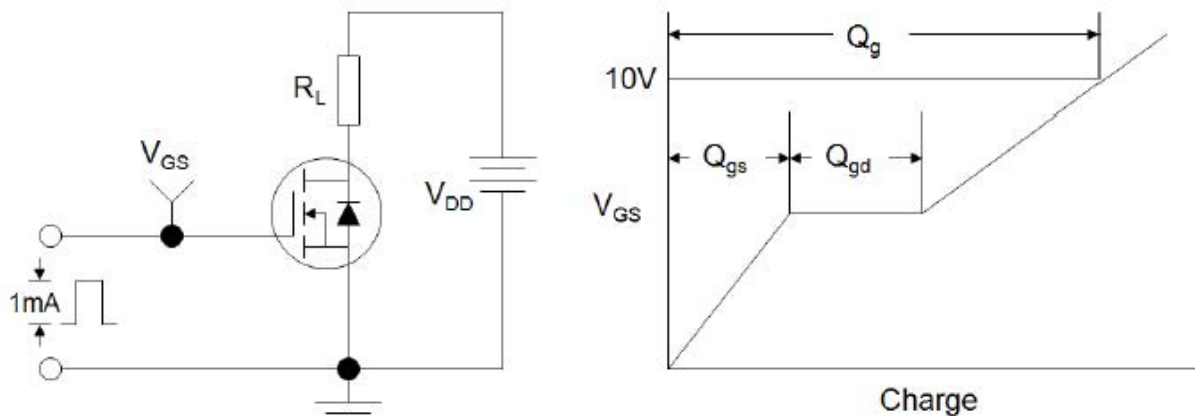


Figure 13. Resistive Switching Test Circuit and Waveform

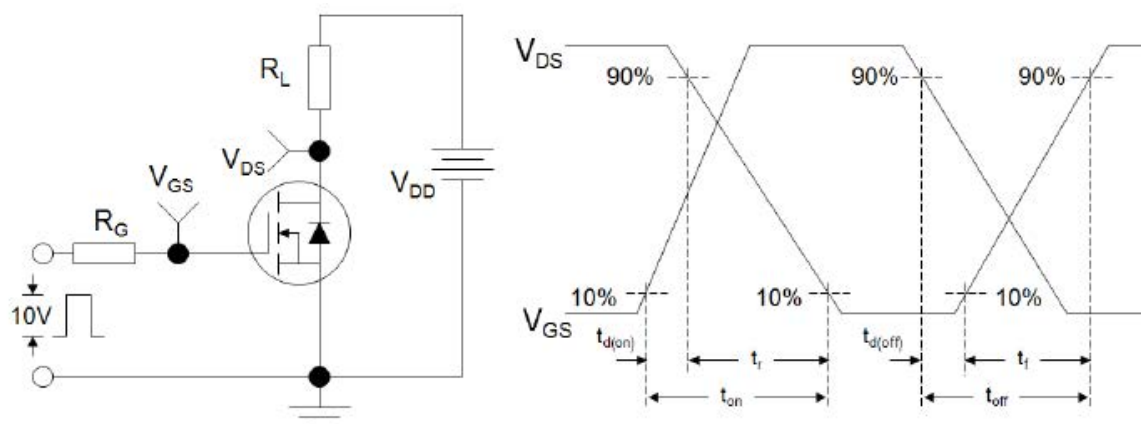
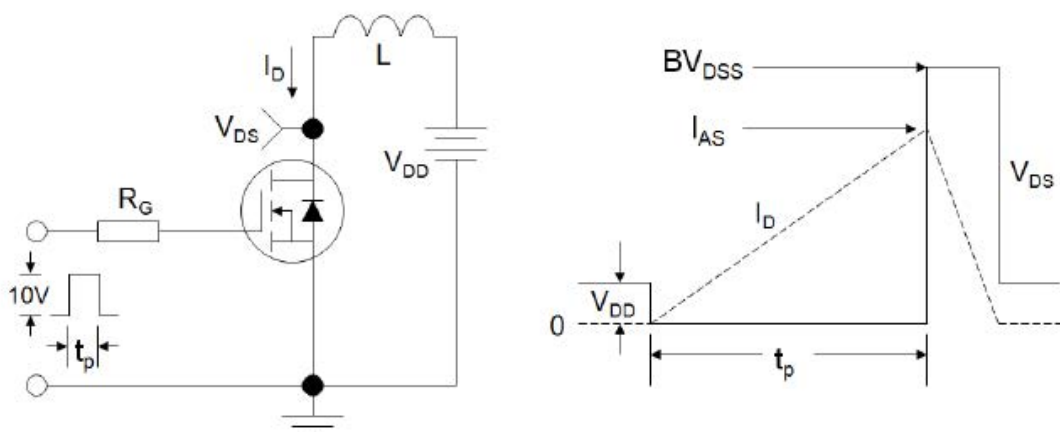
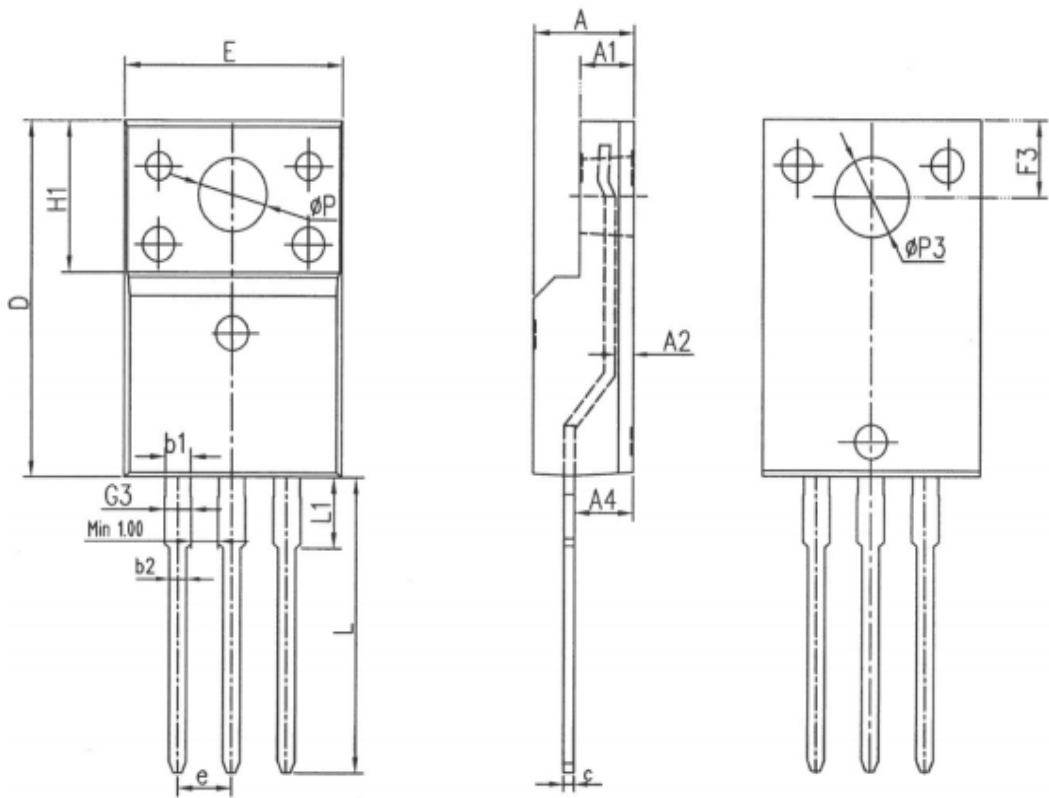


Figure 14. Unclamped Inductive Switching Test Circuit and Waveform



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		
Φ P	3.183REF		
L	12.68	12.98	13.28
L1	3.25	3.45	3.65
Φ P3	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 Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BMF65N135UE1	BMF65N135UE1	TO-220F	Tube	50 units

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