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## 8 YgW]dijcb`

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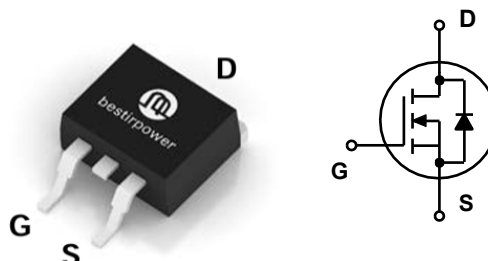
## : YUhi fYg`

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700 VÁ	25 ÖÁ	140Á Á	45Á ÖÁ

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## 5 dd`jW]cbg`

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## 5 Vgc`i h`AU [ja i a `FUh]b] g` (V/°C unless otherwise noted)

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain to Source Voltage <sup>1)</sup>	650	V
$V_{GSS}$	Gate to Source Voltage	±30	V
$I_D$	Drain Current <sup>2)</sup>	Continuous ( $T_C = 25^\circ C$ )	25
		Continuous ( $T_C = 125^\circ C$ )	11
$I_{DM}$	Drain Current	Pulsed ( $T_C = 25^\circ C$ )	75
$E_{AS}$	Single Pulsed Avalanche Energy <sup>3)</sup>	400	mJ
$I_{AR}$	Avalanche Current	4	A
dv/dt	MOSFET dv/dt	50	V/ns
	Peak Diode Recovery dv/dt <sup>4)</sup>	50	
$P_{tot}$	Power Dissipation	( $T_C = 25^\circ C$ )	152
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 150	°C
$I_S$	Continuous diode forward current	$T_C = 25^\circ C$	25
$I_{S,pulse}$	Diode pulse current <sup>2)</sup>	$T_C = 25^\circ C$	75

- 1) Limited by  $T_J$  max. Maximum duty cycle  $D=0.75$ .
- 2) Pulse width  $t_p$  limited by  $T_J$ , max.
- 3)  $V_{DD}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$ .
- 4)  $V_{Dclink}=400V$ ;  $V_{DS,peak} < V_{(BR)DSS}$ ; identical low side and high side switch with identical  $R_G$ .

### Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.82	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62	
$T_{sold}$	Soldering temperature, wavesoldering only allowed at leads	260	°C

Part Number	Top Marking	Package	Packing Method	Quantity
BMB65N140UC1	BMB65N140UC1	TO-263(D <sup>2</sup> PAK)	Tape & Reel	800 units

### Electrical Characteristics (T<sub>c</sub> = 25°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	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	650	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$	-	-	10	μA
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$	-	-	±100	nA

#### On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	3.0	3.8	5.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 12\text{ A}, T_J = 25^\circ\text{C}$	-	120	140	mΩ
$R_G$	Gate resistance	$V_{DD} = 0\text{ V}, V_{GS} = 0\text{ V}, F = 1\text{ MHz}$	-	4	-	Ω

#### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 250\text{ kHz}$	-	2040	-	pF
$C_{oss}$	Output Capacitance		-	82	-	pF
$C_{riss}$	Reverse transfer Capacitance		-	3.8	-	pF
$C_{o(tr)}$	Time Related Output Capacitance <sup>1)</sup>	$V_{DS} = 0\text{ to }400\text{ V}, V_{GS} = 0\text{ V}$	-	324	-	pF
$C_{o(er)}$	Energy Related Output Capacitance <sup>2)</sup>		-	62	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	$V_{DD} = 400\text{ V}, I_D = 12\text{ A}, V_{GS} = 0\text{ to }10\text{ V}$	-	45	-	nC
$Q_{gs}$	Gate to Source Charge		-	11.5	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge		-	20	-	nC
$V_{plateau}$	Gate plateau voltage		-	6.1	-	V

#### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400\text{ V}, I_D = 12\text{ A}, V_{GS} = 10\text{ V}$	-	12	-	ns
$t_r$	Turn-On Rise Time		-	15	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	68	-	ns
$t_f$	Turn-Off Fall Time		-	6	-	ns

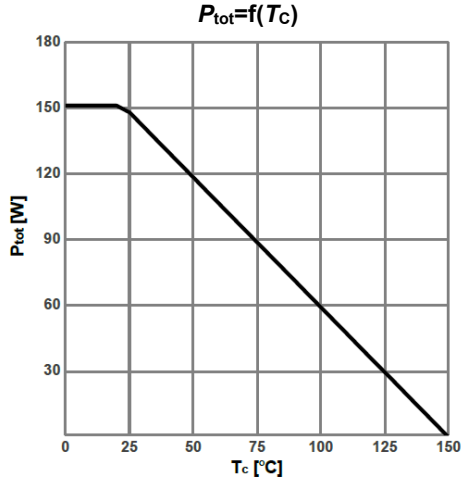
#### Source-Drain Diode Characteristics

$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_F = 12\text{ A}, T_f = 25^\circ\text{C}$	-	0.88	-	V
$t_{rr}$	Reverse Recovery Time	$V_R = 400\text{ V}, I_F = 12\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	-	165	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	1.15	-	μC
$I_{rrm}$	Peak reverse recovery current		-	15	-	A

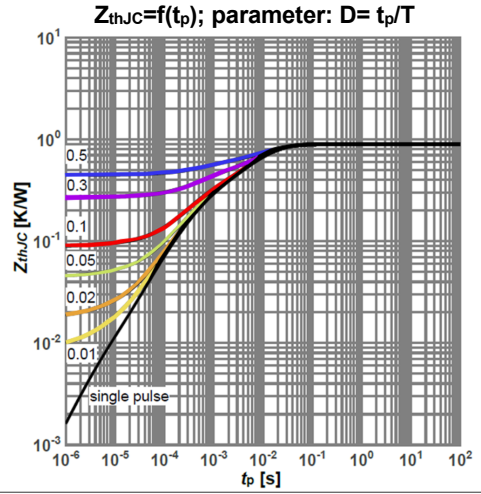
- $C_{o(tr)}$  is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 400V.
- $C_{o(er)}$  is a fixed capacitance that gives the same stored energy as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 400V.

### Typical Performance Characteristics

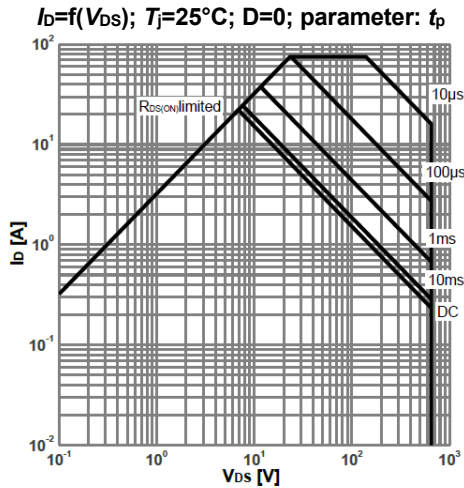
**Figure 1. Power dissipation**



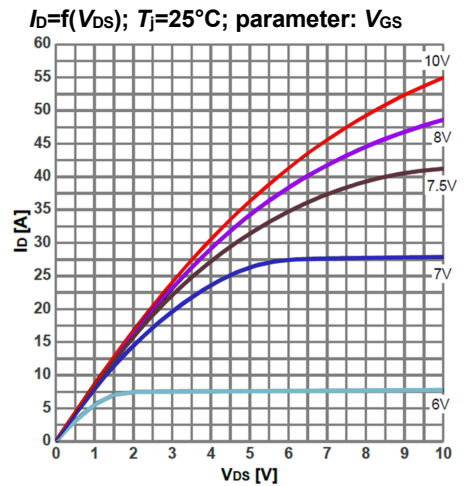
**Figure 2. Max. transient thermal impedance**



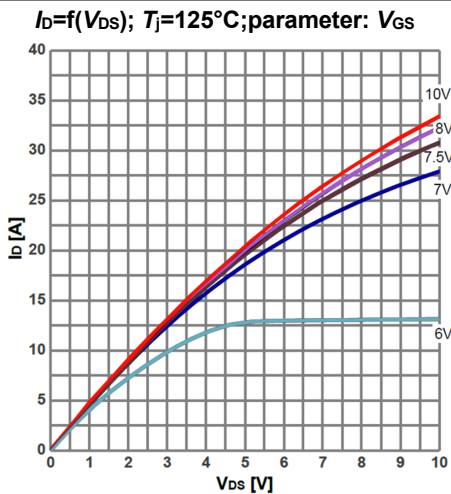
**Figure 3. Safe operating area**



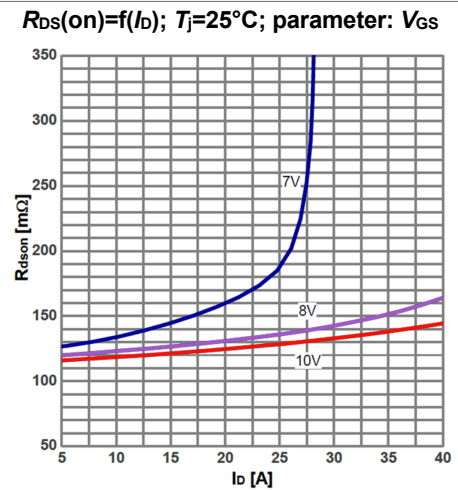
**Figure 4. Typ. Output characteristics**



**Figure 5. Typ. Output characteristics**



**Figure 6. Typ. drain-source on-state resistance**



### Typical Performance Characteristics

Figure 7. Typ. drain-source on-state resistance

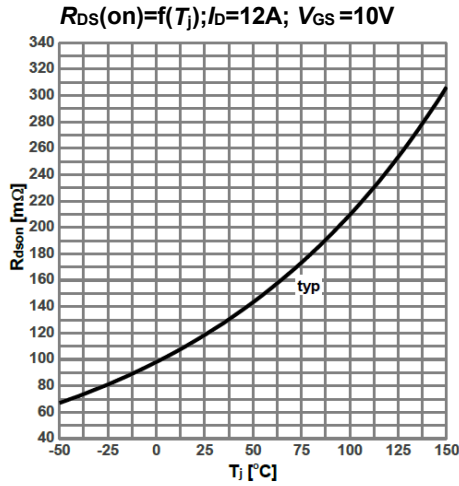


Figure 8. Typ. transfer characteristics

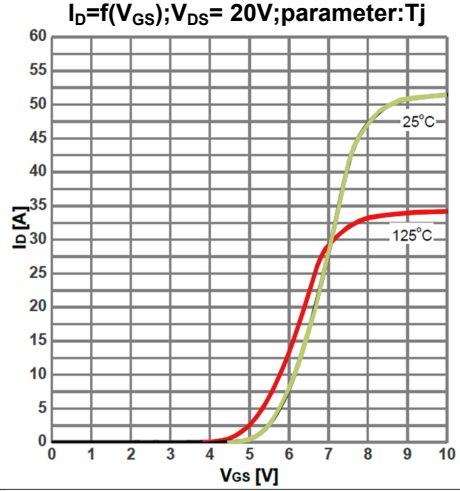


Figure 9. Typ. gate charge

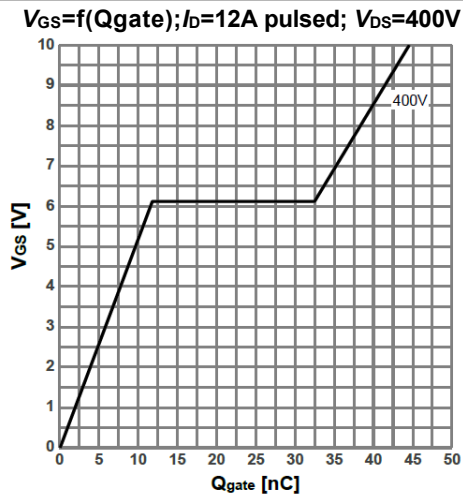


Figure 10. Typ. forward characteristics of reverse diode

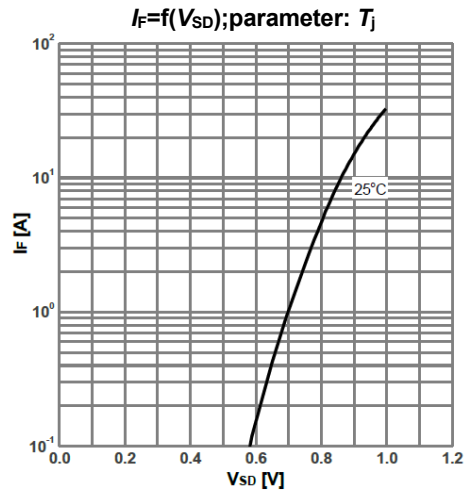


Figure 11. Typ. drain-source breakdown voltage

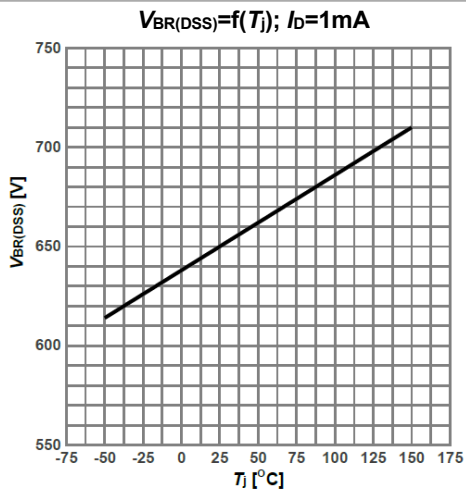
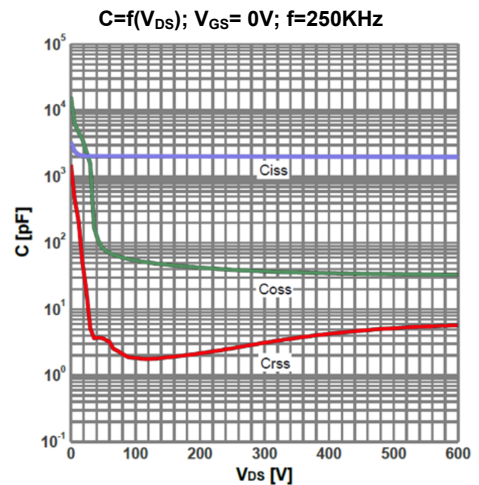
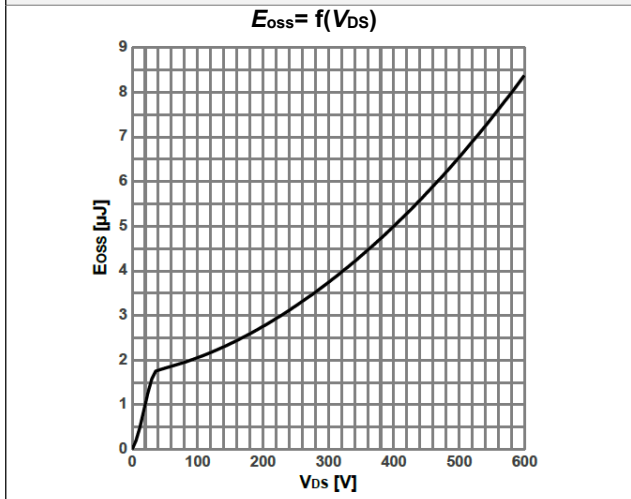


Figure 12. Typ. Capacitances



### Typical Performance Characteristic

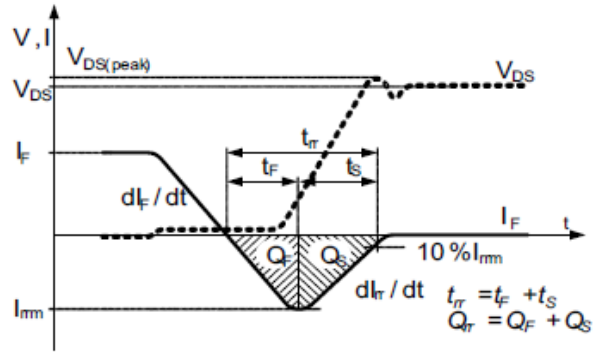
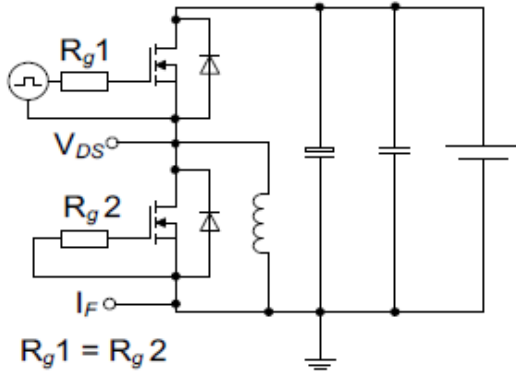
Figure 13. Typ.  $E_{oss}$  stored energy



**Test Circuits**

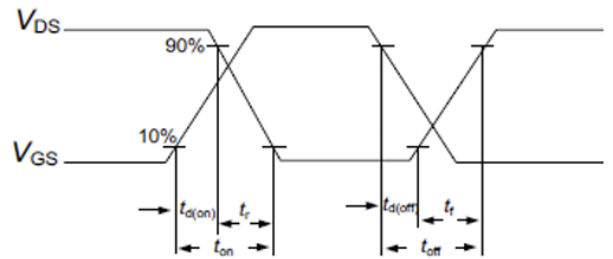
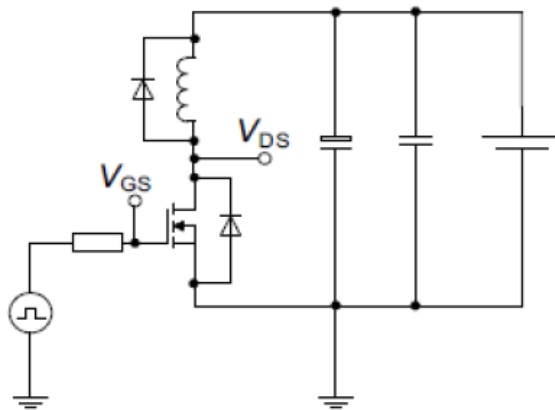
**Figure 14. Diode Characteristics**

**Test circuit for diode characteristics and Diode recovery waveform**



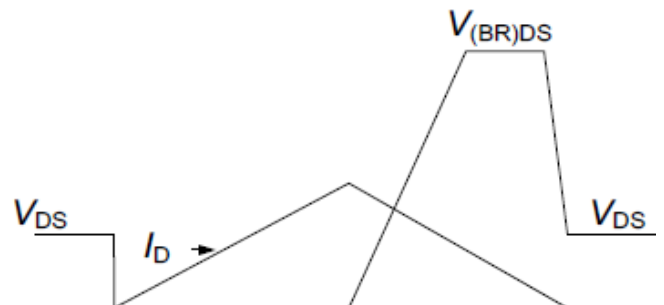
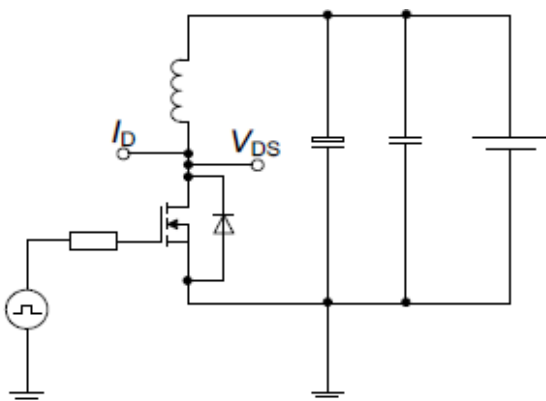
**Figure 15. Switching Times**

**Switching times test circuit for inductive load and Switching times waveform**



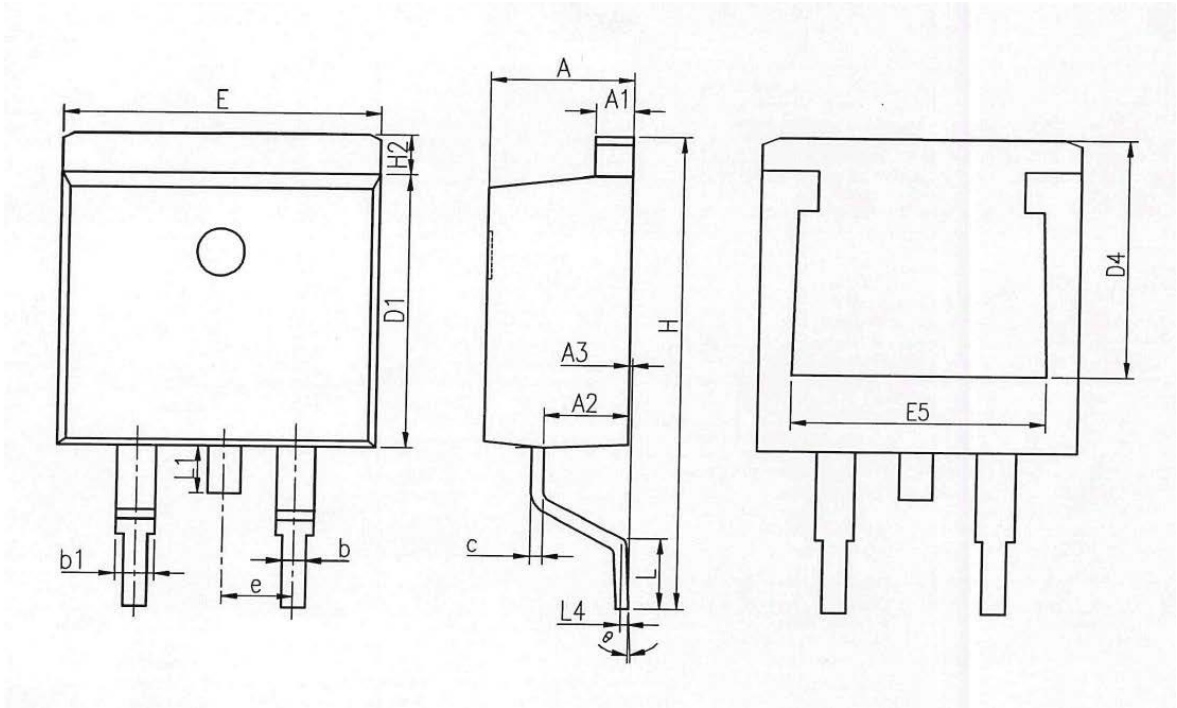
**Figure 16. Unclamped Inductive Load**

**Unclamped inductive load test circuit and Unclamped inductive waveform**



## Package Outlines

# TO263-2L



### 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

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