

Product Summary

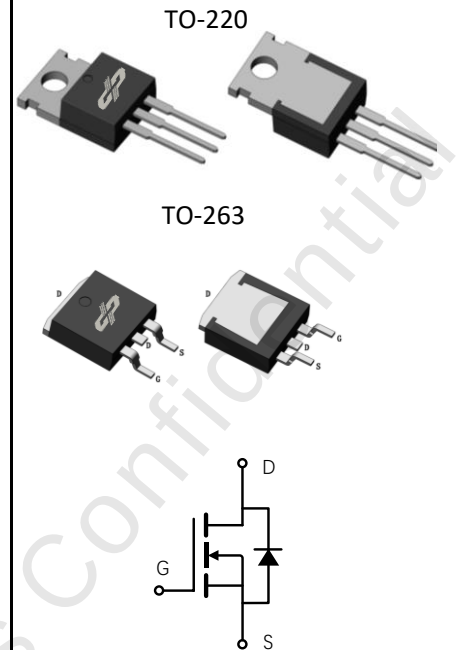
Part #	V_{DS}	$R_{DS(on).typ}$	I_D
DP090NE6PTN	68V	6.6mΩ	88A
DP090NE6BTN		6.8mΩ	

Features

- Uses advanced MOSFET-DPMOS2 technology
- Extremely low $R_{DS(on)}$ /High Speed Power Switching
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

Applications

- Motor control and drive
- Power Management Switches
- High-frequency switching and synchronous rectification



100% Avalanche Tested

100% Rg Tested

Package Marking and Ordering Information

Part #	Marking	Package	Packing
DP090NE6PTN	090NE6PTN	TO-220	Tube
DP090NE6BTN	090NE6BTN	TO-263	Tube/Reel


Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	68	V
Continuous drain current	I_D	88	A
$T_C = 25^\circ\text{C}$		56	
$T_C = 100^\circ\text{C}$			
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	352	A
Avalanche energy, single pulse ($L=0.3\text{mH}$, $R_g=25$) ^[1]	E_{AS}	153	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	114	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	$^\circ\text{C}$

[1].EAS is tested at starting $T_j = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	1.1	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	67	

Electrical Characteristic (at $T_j = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Drain-source breakdown voltage	BV_{DSS}	68	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=68V, V_{GS}=0V$ $T_j=25^\circ\text{C}$
		-	-	100		$T_j=150^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	6.6 6.8	8.5 8.8	mΩ	$T_j=25^\circ\text{C}$ $V_{GS}=10V, I_D=30A(TO-263)$ $V_{GS}=10V, I_D=30A(TO-220)$
Gate resistance	R_g	-	1.6	5.0	Ω	$V_{GS}=0V, V_{DS}=0V,$ $f=1\text{MHz}$
Transconductance ^[2]	g_{fs}	-	50	-	S	$V_{DS}=5V, I_D=20A$

Dynamic Characteristic^[2]

Input Capacitance	C_{iss}	-	1070	-	pF	$V_{GS}=0V, V_{DS}=30V,$ $f=1\text{MHz}$
Output Capacitance	C_{oss}	-	330	-		
Reverse Transfer Capacitance	C_{rss}	-	15	-		
Gate Total Charge@ $V_{GS}=10V$	Q_g	-	21	-	nC	$V_{GS}=10V, V_{DS}=30V,$ $I_D=20A, f=1\text{MHz}$
Gate-Source charge	Q_{gs}	-	5.5	-		
Gate-Drain charge	Q_{gd}	-	4	-		
Turn-on delay time	$t_{d(on)}$	-	19	-	ns	$V_{GS}=10V, V_{DD}=30V,$ $R_{G_ext}=2.7\Omega, I_D=40A$
Rise time	t_r	-	57	-		
Turn-off delay time	$t_{d(off)}$	-	72	-		
Fall time	t_f	-	18	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	-	1.2	V	$V_{GS}=0V, I_{SD}=40A$
Diode continuous forward current	I_s	-	-	88	A	$T_C = 25^{\circ}C$
Diode pluse current	$I_{s\ pluse}$	-	-	352	A	$T_C = 25^{\circ}C$
Body Diode Reverse Recovery Time ^[2]	t_{rr}	-	22	-	ns	$I_F=40A, dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge ^[2]	Q_{rr}	-	60	-	nC	

[2]. Defined by design. Not subject to production test

Typical Performance Characteristics

Fig 1: Output Characteristics

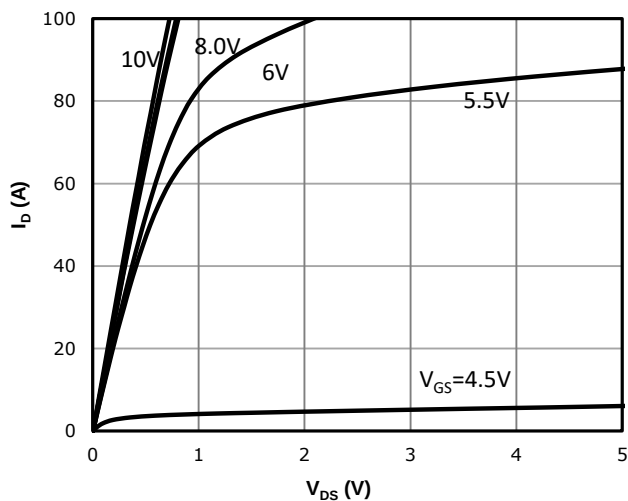


Fig 2: Transfer Characteristics

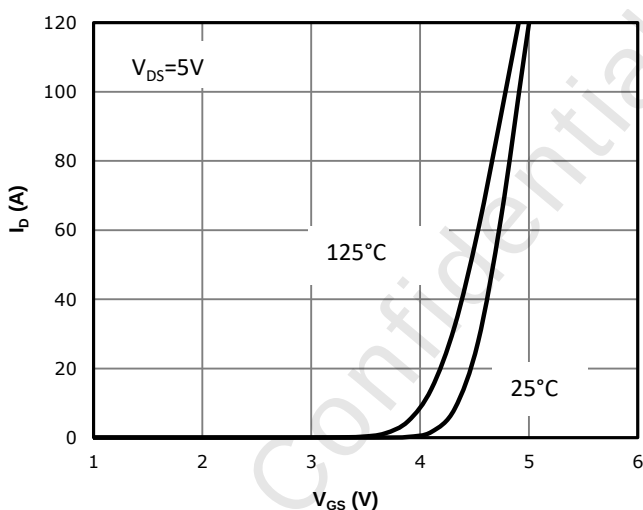


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

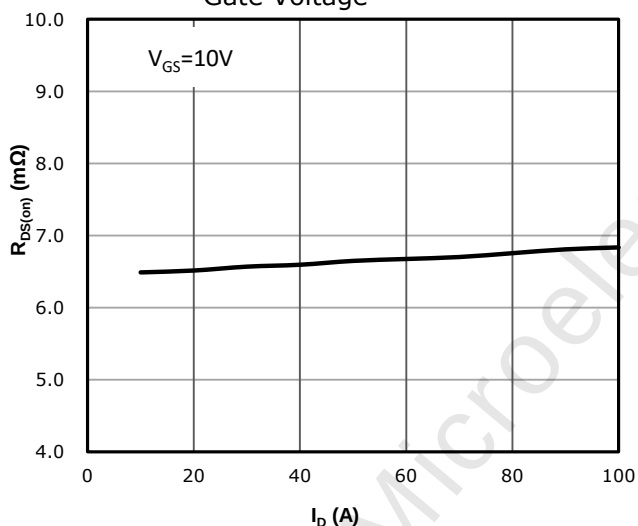


Fig 4: $R_{DS(on)}$ vs Gate Voltage

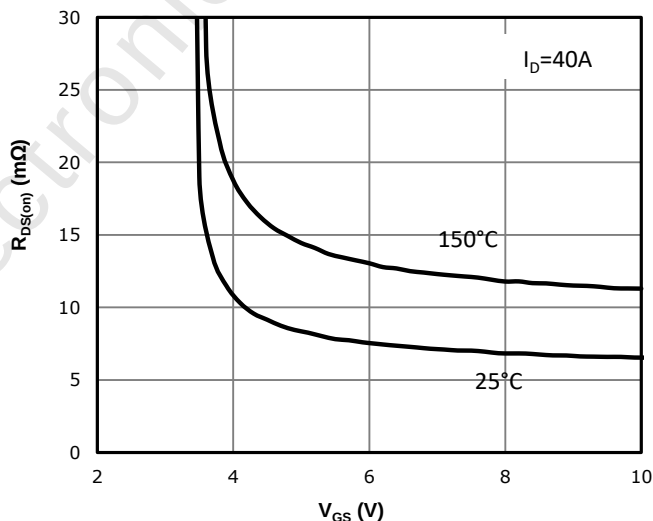


Fig 5: $R_{DS(on)}$ vs. Temperature

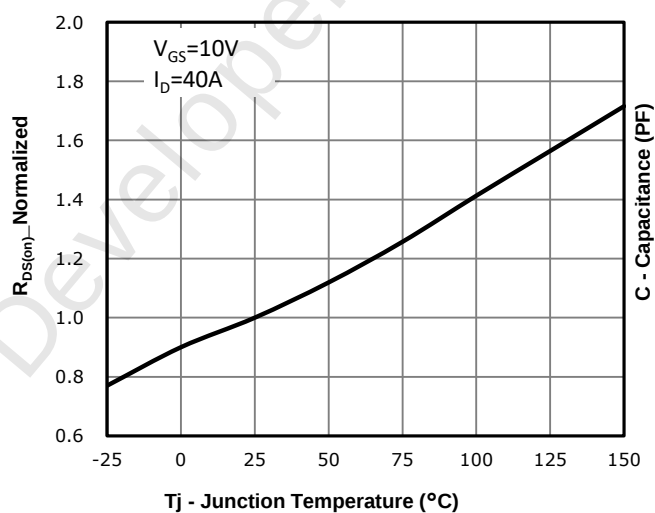


Fig 6: Capacitance Characteristics

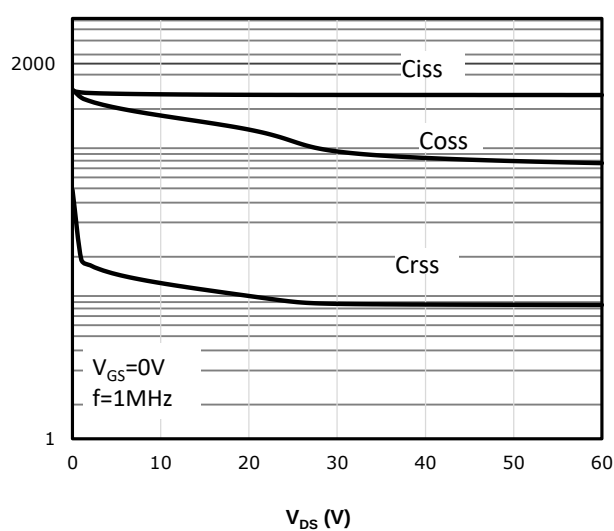


Fig 7: Gate Charge Characteristics

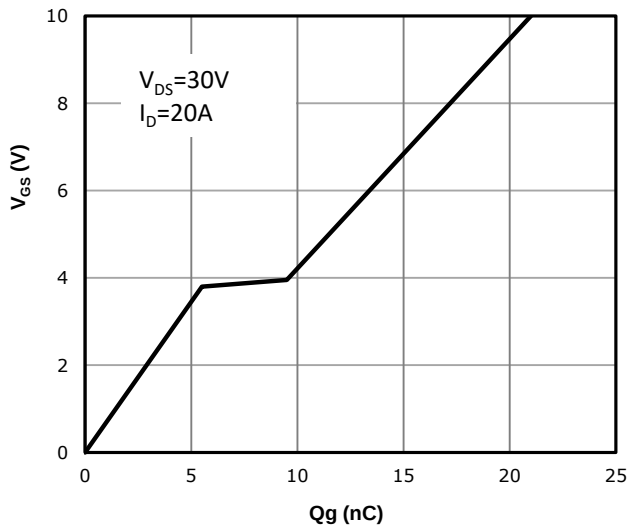


Fig 8: Body-diode Forward Characteristics

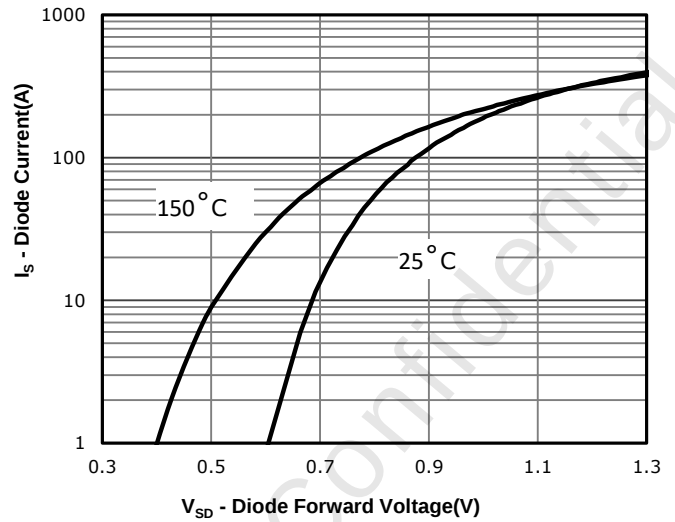


Fig 9: Power Dissipation

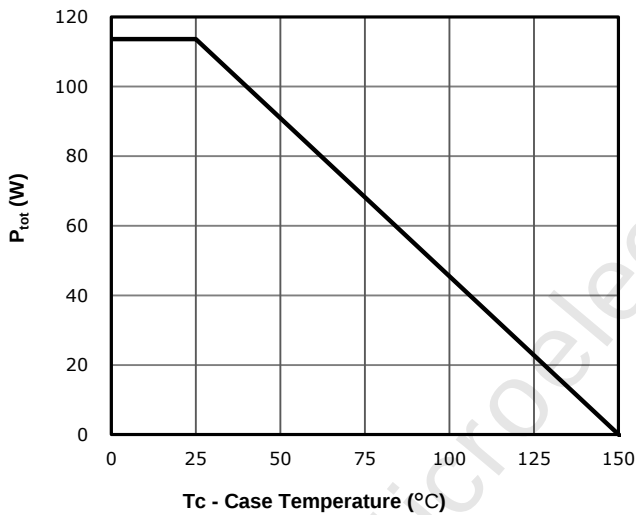


Fig 10: Drain Current Derating

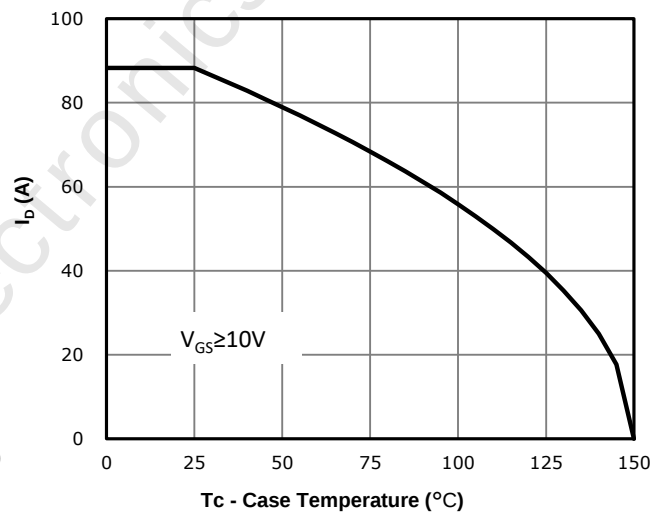


Fig 11: Safe Operating Area

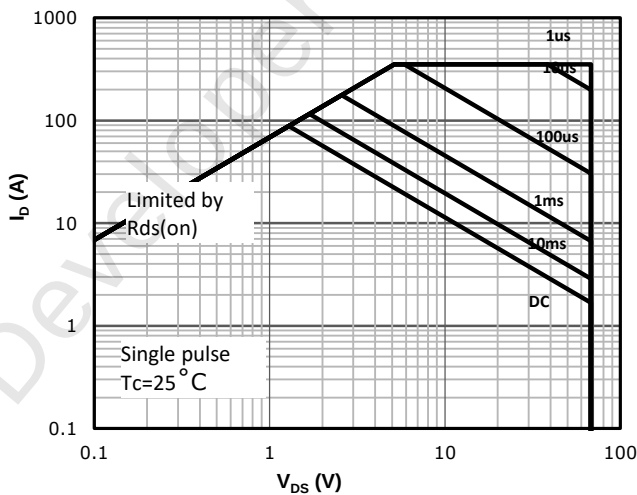
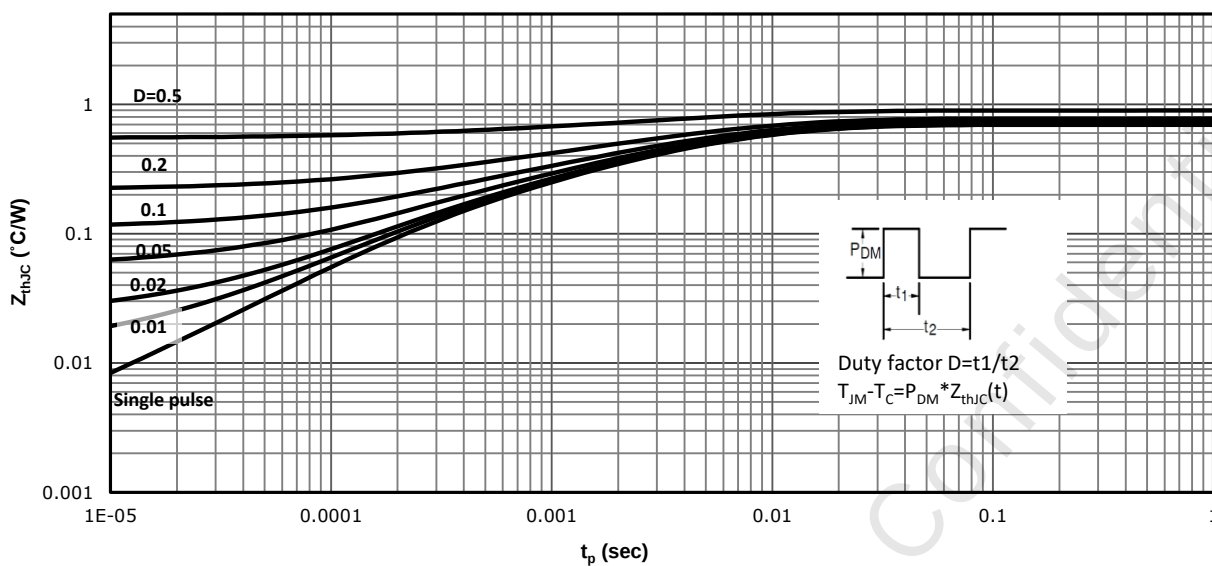
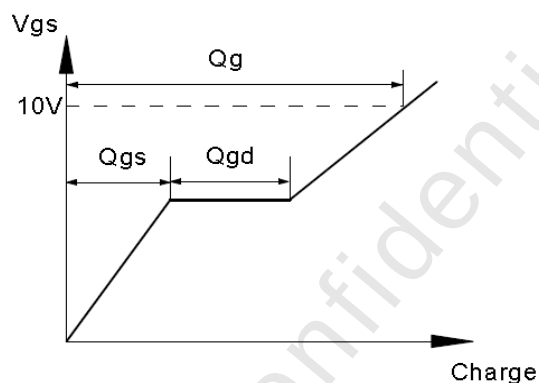
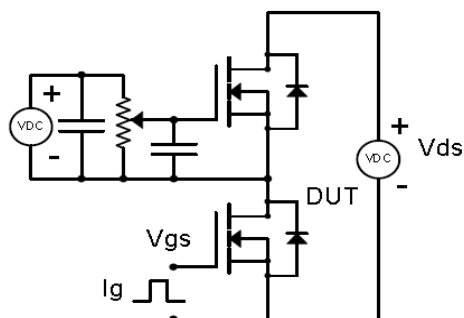


Fig 12: Max. Transient Thermal Impedance

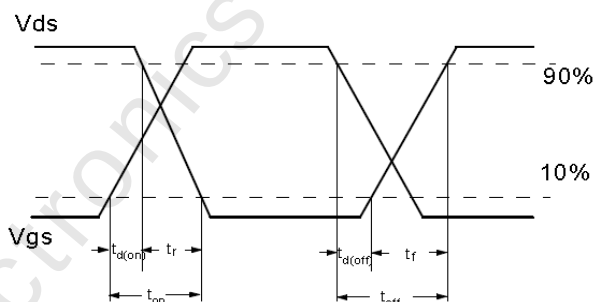
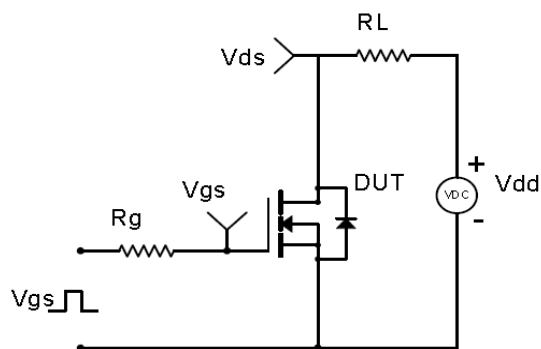


Test Circuit & Waveform

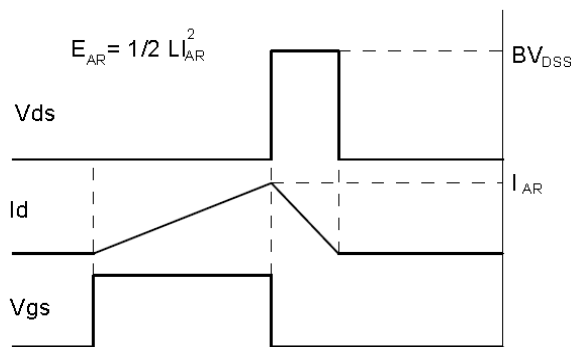
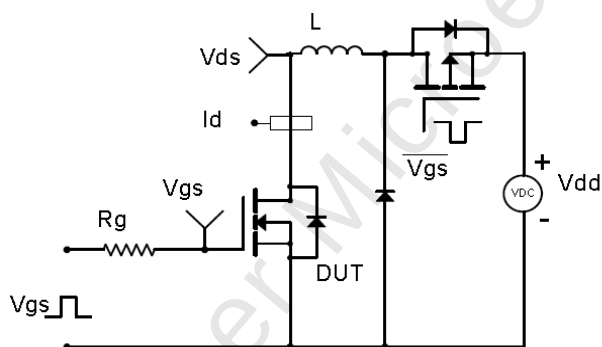
Gate Charge Test Circuit & Waveform



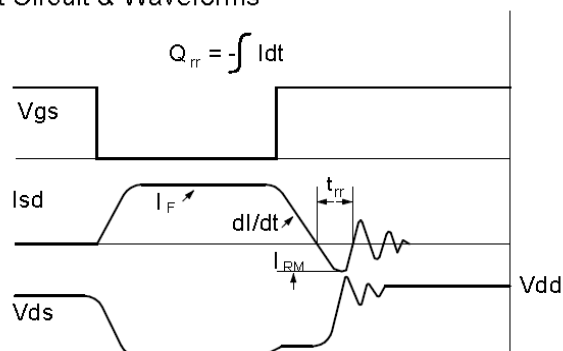
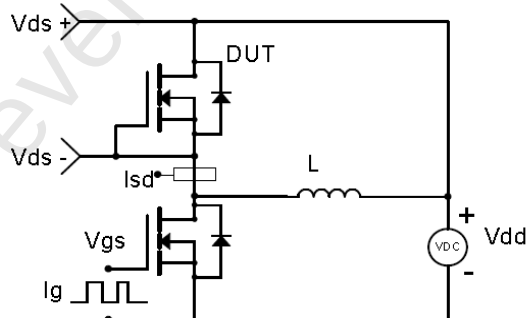
Resistive Switching Test Circuit & Waveforms



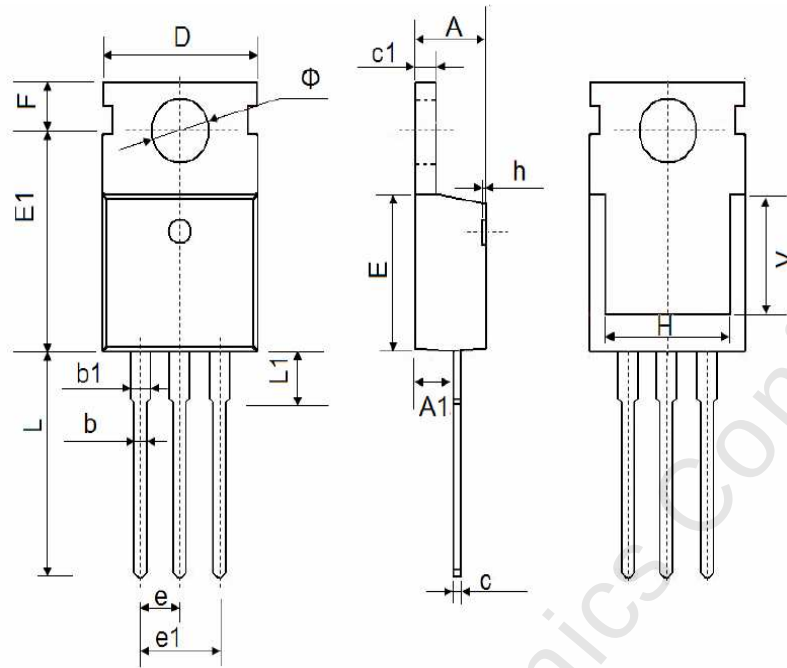
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

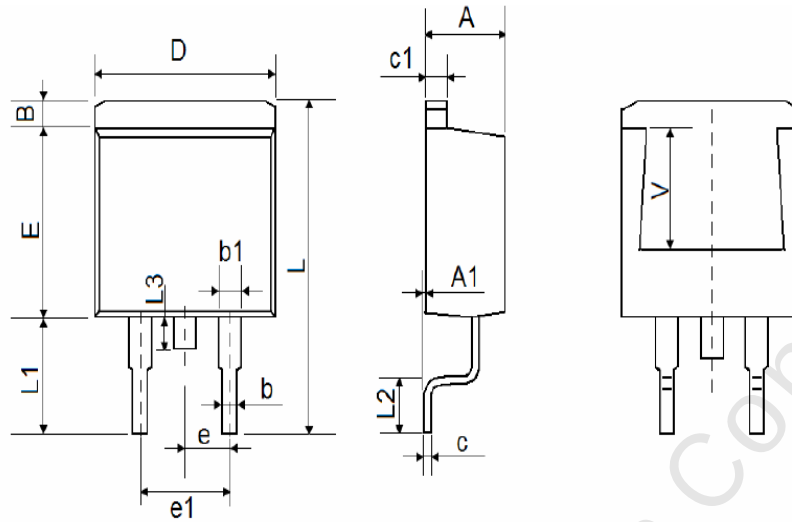


Package Outline: TO-220-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.70	0.169	0.185
A1	2.25	2.55	0.089	0.100
b	0.71	0.91	0.028	0.036
b1	1.17	1.37	0.046	0.054
c	0.33	0.65	0.013	0.026
c1	1.20	1.40	0.047	0.055
D	9.91	10.25	0.390	0.404
E	8.95	9.75	0.352	0.384
E1	12.65	12.95	0.498	0.510
e	2.54 BSC.		0.100 BSC.	
e1	4.98	5.18	0.196	0.204
F	2.65	2.95	0.104	0.116
H	7.90	8.10	0.311	0.319
h	0.00	0.30	0.000	0.012
L	12.90	13.40	0.508	0.528
L1	2.85	3.25	0.112	0.128
V	7.500 Ref.		0.295 Ref.	
Φ	3.400	3.800	0.134	0.150

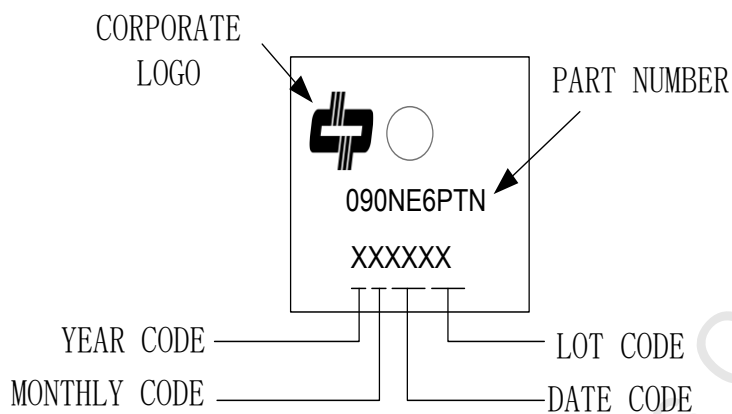
Package Outline: TO-263



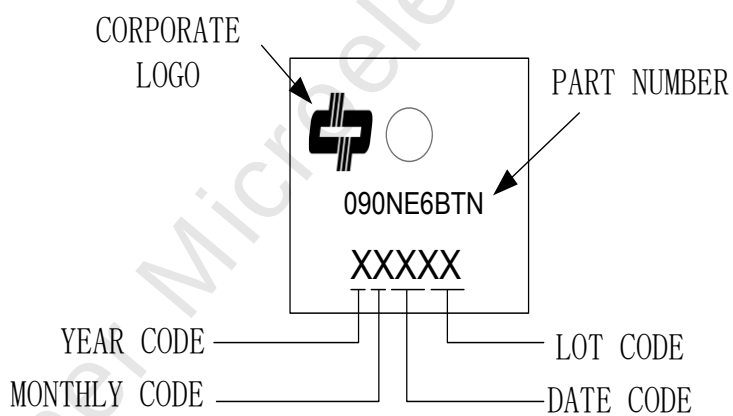
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.80	0.173	0.189
A1	0.00	0.15	0.000	0.006
B	1.17	1.37	0.046	0.054
b	0.71	0.91	0.028	0.036
b1	1.17	1.37	0.046	0.054
c	0.31	0.53	0.012	0.021
c1	1.17	1.37	0.046	0.054
D	10.01	10.31	0.394	0.406
E	8.50	8.90	0.335	0.350
e	2.54 BSC.		0.100 BSC.	
e1	4.98	5.18	0.196	0.204
L	15.05	15.45	0.593	0.608
L1	5.08	5.48	0.200	0.216
L2	2.34	2.74	0.092	0.108
L3	1.30	1.70	0.051	0.067
V	5.600 Ref.		0.220 Ref.	

Part Marking Information

DP090NE6PTN



DP090NE6BTN



Revision History

Revision	Major changes
1.0	Release for formal version

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