



# **Datasheet of DP6580**

## **(TO-252/263/220)**

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### Features

- Uses advanced Trench MOS technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent  $Q_g \times R_{DS(on)}$  product(FOM)
- Qualified according to JEDEC criteria

### Applications

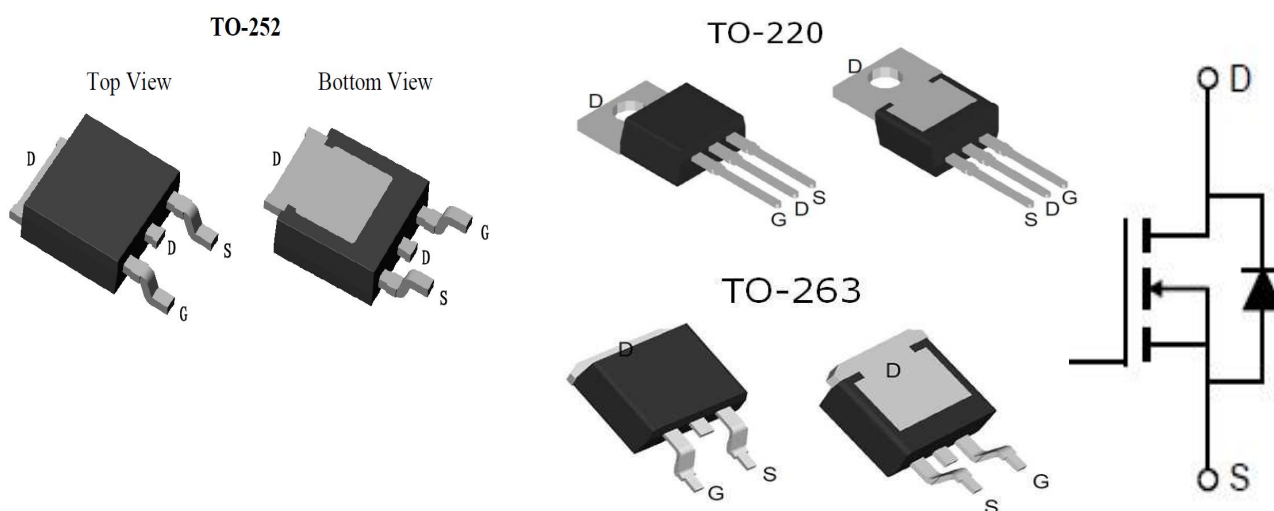
- Motor control and drive
- Battery management
- UPS (Uninterruptible Power Supplies)

### Product Summary

$V_{DS}$	65V
$R_{DS(on)}$ typ.	7.1mΩ
$I_D$	85A

**100% DVDS Tested**

**100% Avalanche Tested**



### Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
DP6580	-	TO-252	Reel	N/A	N/A	2500pcs
		TO-220	Tube	N/A	N/A	50pcs
		TO-263	Tube	N/A	N/A	50pcs

### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	65	V
Continuous drain current	$I_D$	85	A
$T_C = 25^\circ\text{C}$ (Silicon limit)		87	
$T_C = 25^\circ\text{C}$ (Package limit)		54	
Pulsed drain current ( $T_C = 25^\circ\text{C}$ , $t_p$ limited by $T_{jmax}$ )	$I_{D\ pulse}$	340	A
Avalanche energy, single pulse ( $L=0.5\text{mH}$ , $R_g=25\Omega$ )	$E_{AS}$	400	mJ



Gate-Source voltage	$V_{GS}$	±25	V
Power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_{tot}$	98	W
Operating junction and storage temperature	$T_j, T_{stg}$	-55...+150	$^\circ\text{C}$

### Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	$R_{thJC}$	1.27	$^\circ\text{C/W}$
Thermal resistance, junction – ambient(min. footprint)	$R_{thJA}$	102	

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

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

### Static Characteristic

Drain-source breakdown voltage	$BV_{DSS}$	65	-	-	V	$V_{GS}=0V, I_D=250\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$
Zero gate voltage drain current	$I_{DSS}$	-	0.05	1 5	$\mu\text{A}$	$V_{DS}=65V, V_{GS}=0V$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$
Gate-source leakage current	$I_{GSS}$	-	10	100	nA	$V_{GS}=25V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	7.1	8.4	$\text{m}\Omega$	$V_{GS}=10V, I_D=40A,$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$
Transconductance	$g_{fs}$	-	84	-	S	$V_{DS}=5V, I_D=40A$

### Dynamic Characteristic

Input Capacitance	$C_{iss}$	-	5101	-	pF	$V_{GS}=0V, V_{DS}=32V,$ $f=1\text{MHz}$
Output Capacitance	$C_{oss}$	-	319	-		
Reverse Transfer Capacitance	$C_{rss}$	-	292	-		
Gate Total Charge	$Q_G$	-	77	-	nC	$V_{GS}=10V, V_{DS}=50V,$ $I_D=40A, f=1\text{MHz}$
Gate-Source charge	$Q_{gs}$	-	18	-		
Gate-Drain charge	$Q_{gd}$	-	30	-		
Turn-on delay time	$t_{d(on)}$	-	28	-	ns	$V_{GS}=10V, V_{DD}=20V,$ $R_{G\_ext}=3\Omega, I_D=40A,$
Rise time	$t_r$	-	64	-		
Turn-off delay time	$t_{d(off)}$	-	66	-		
Fall time	$t_f$	-	28	-		



Gate resistance	$R_G$	-	2.6	-	$\Omega$	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$
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**Body Diode Characteristic**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	$V_{SD}$	-	0.9	1.3	V	$V_{GS}=0V, I_{SD}=40A$
Body Diode Reverse Recovery Time	$t_{rr}$	-	42	-	ns	$I_F=40A, dI/dt=100A/\mu$ s
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	55	-	nC	



### Typical Performance Characteristics

Fig 1: Output Characteristics

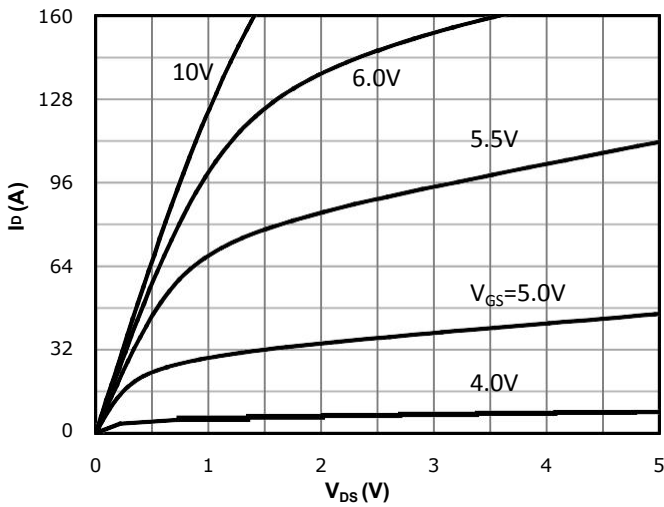


Fig 2: Transfer Characteristics

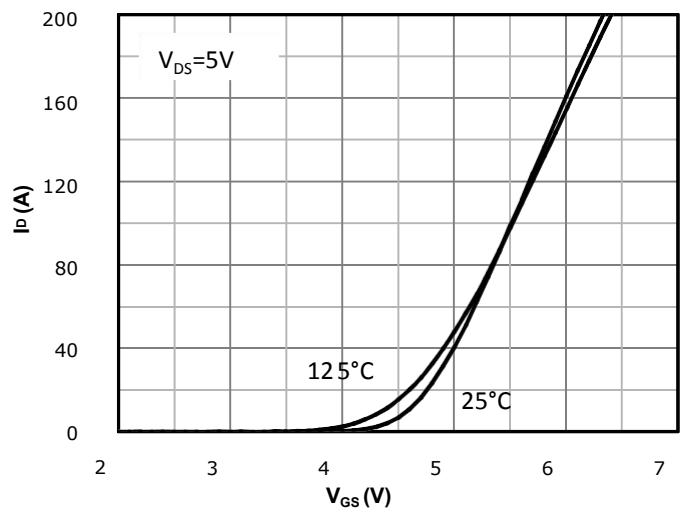


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

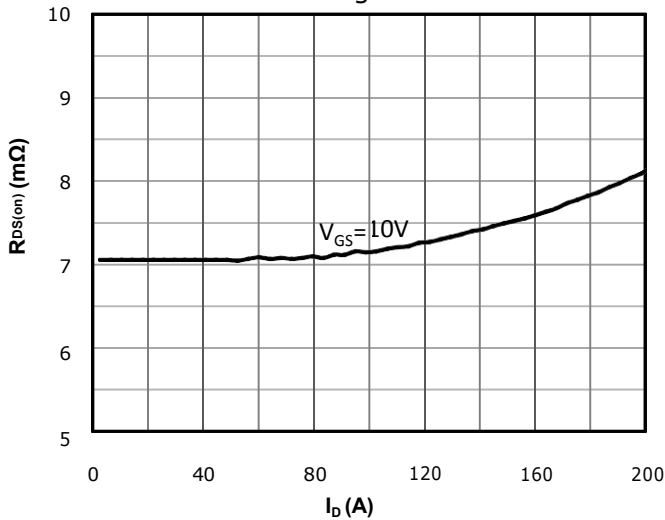


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

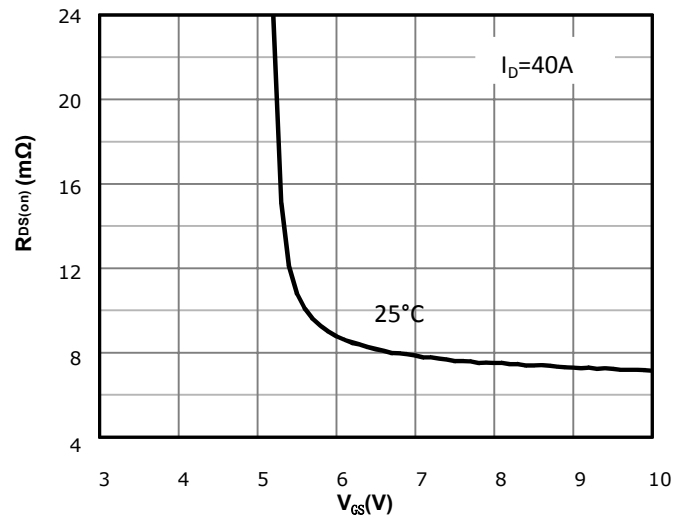


Fig 5:  $R_{DS(on)}$  vs. Temperature

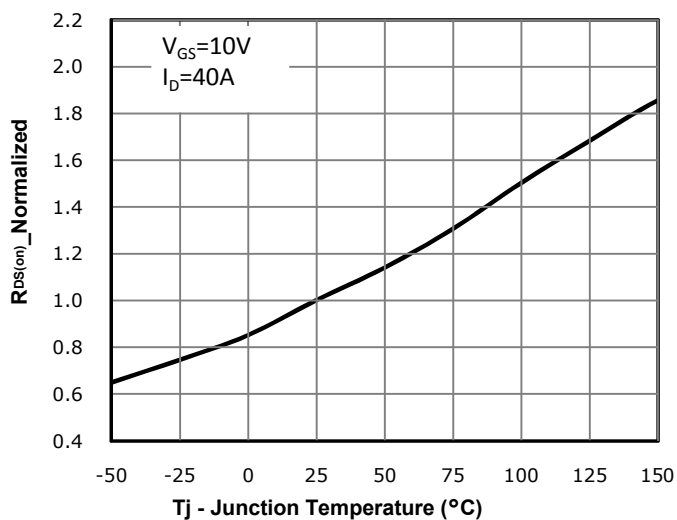


Fig 6: Capacitance Characteristics

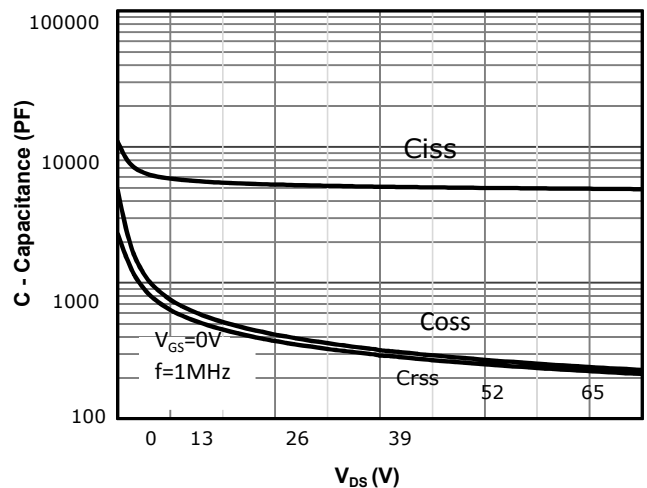




Fig 7: Gate Charge Characteristics

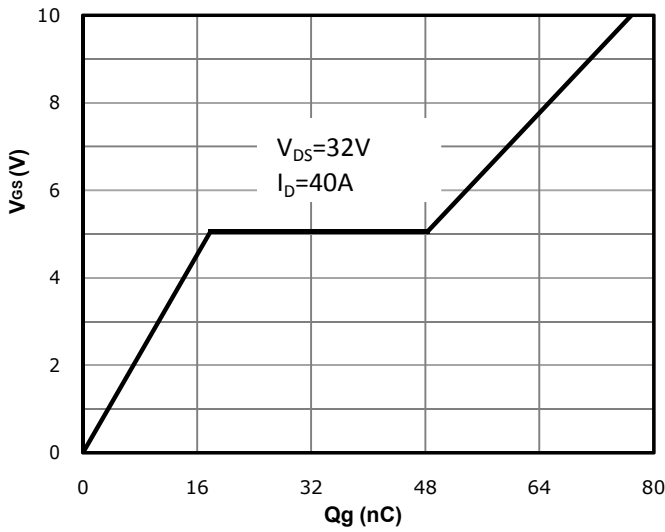


Fig 8: Body-diode Forward Characteristics

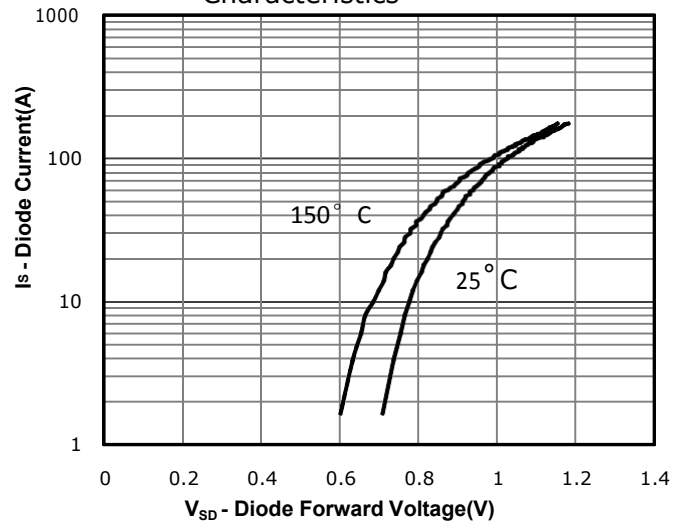


Fig 9: Power Dissipation

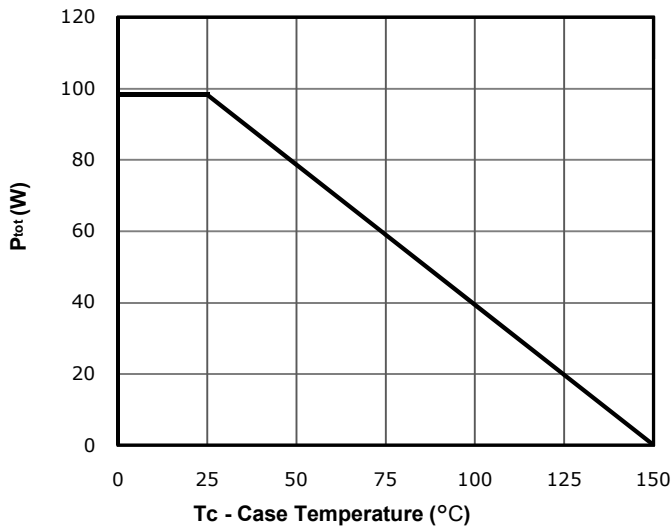


Fig 10: Drain Current Derating

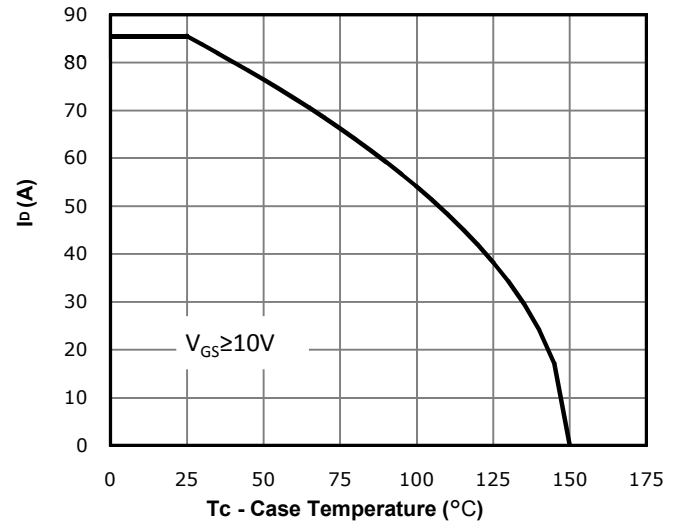


Fig 11: Safe Operating Area

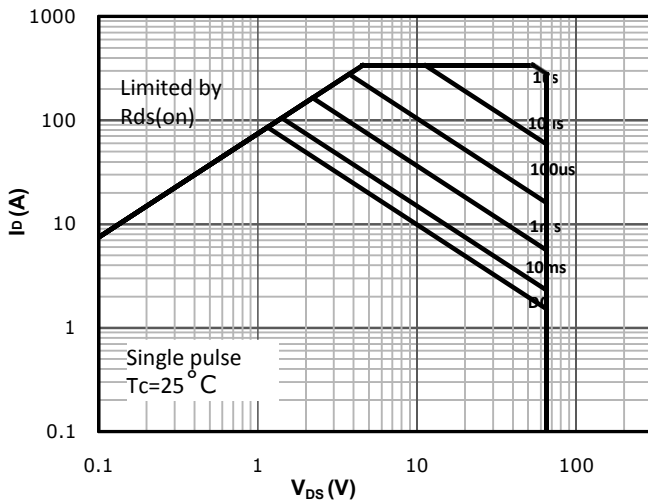
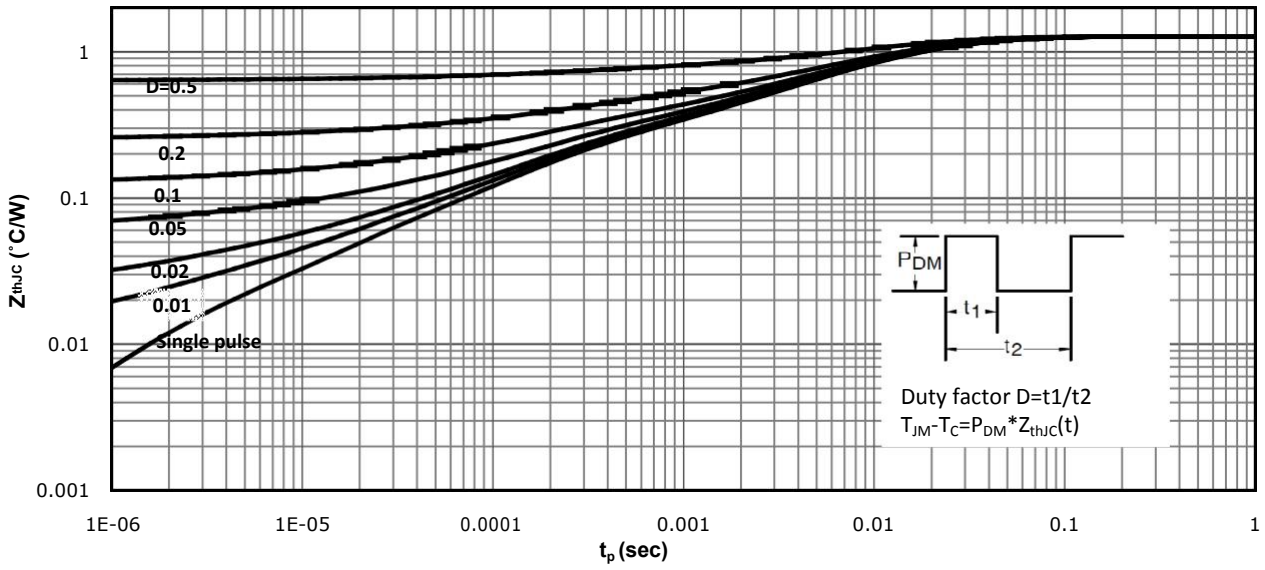




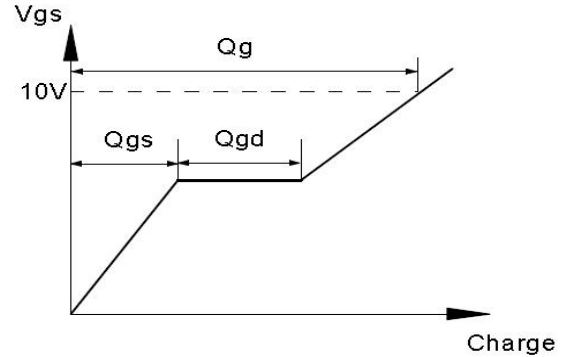
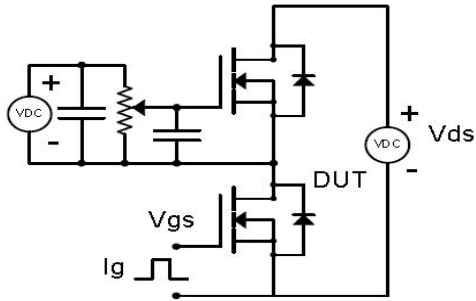
Fig 12: Max. Transient Thermal Impedance



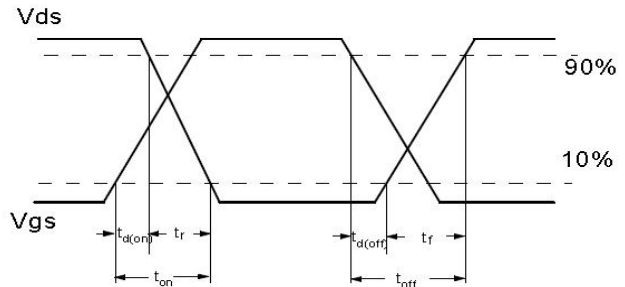
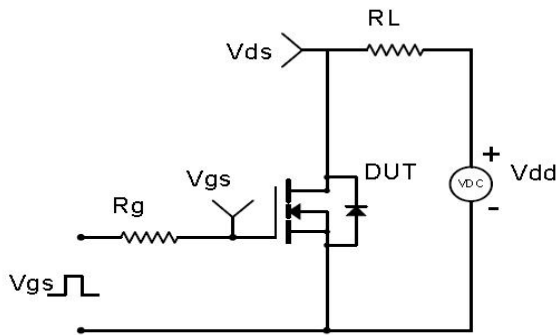


### Test Circuit & Waveform

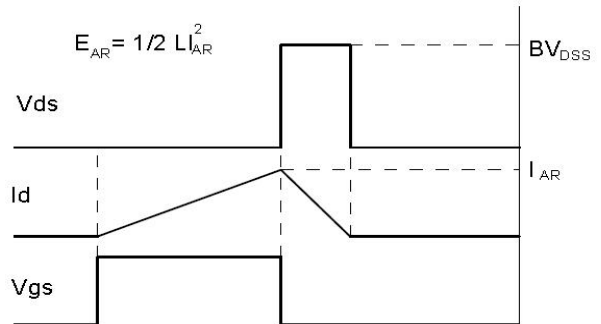
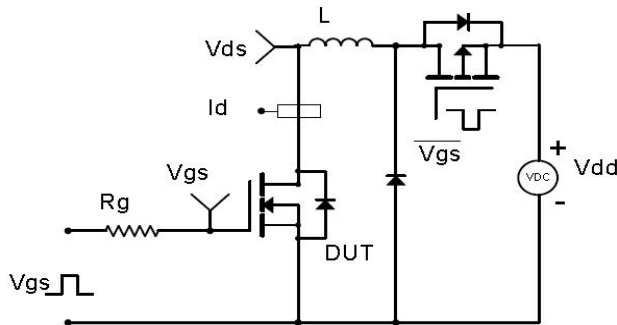
Gate Charge Test Circuit & Waveform



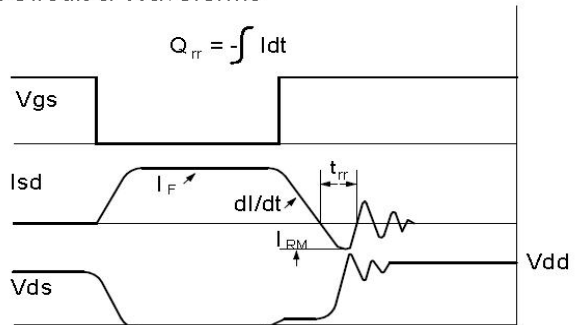
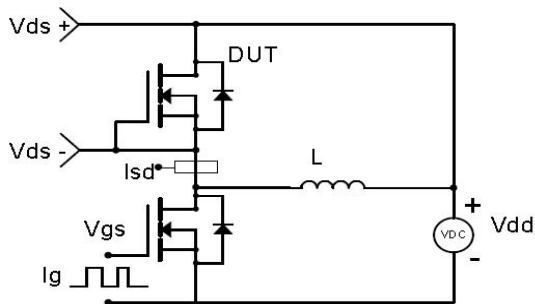
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



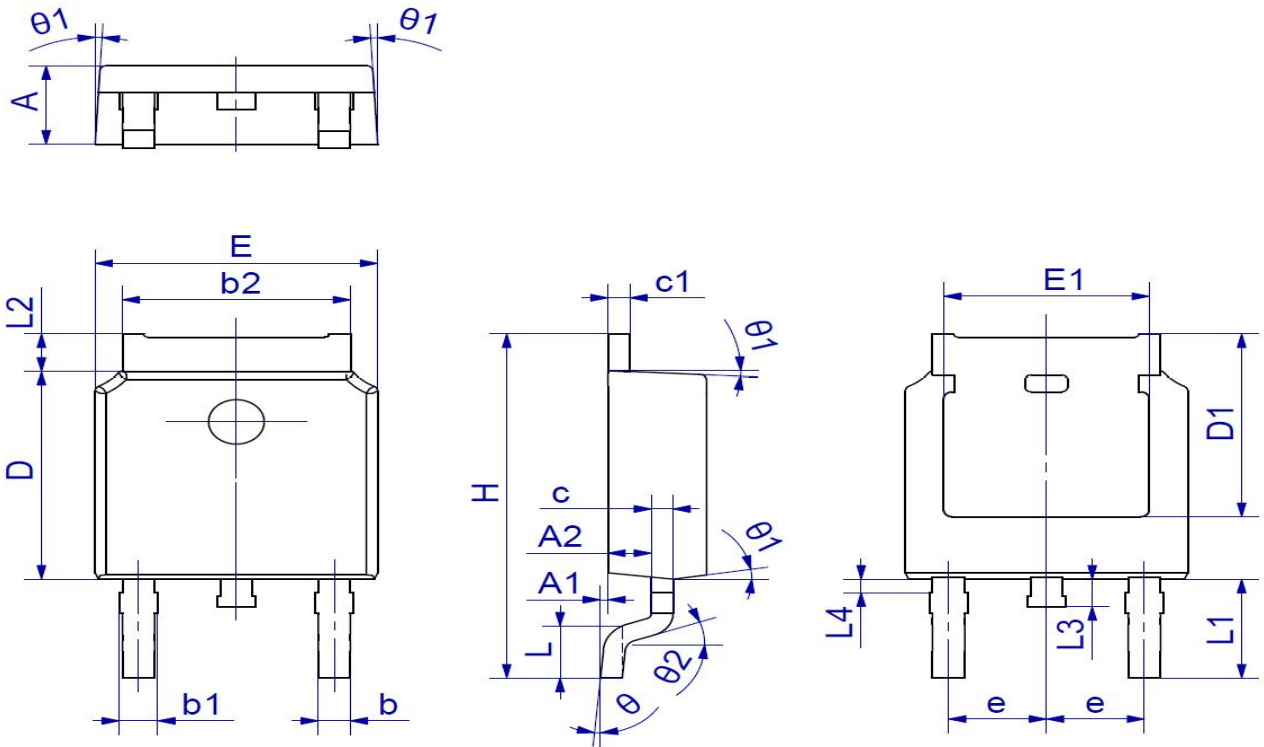
Diode Recovery Test Circuit & Waveforms







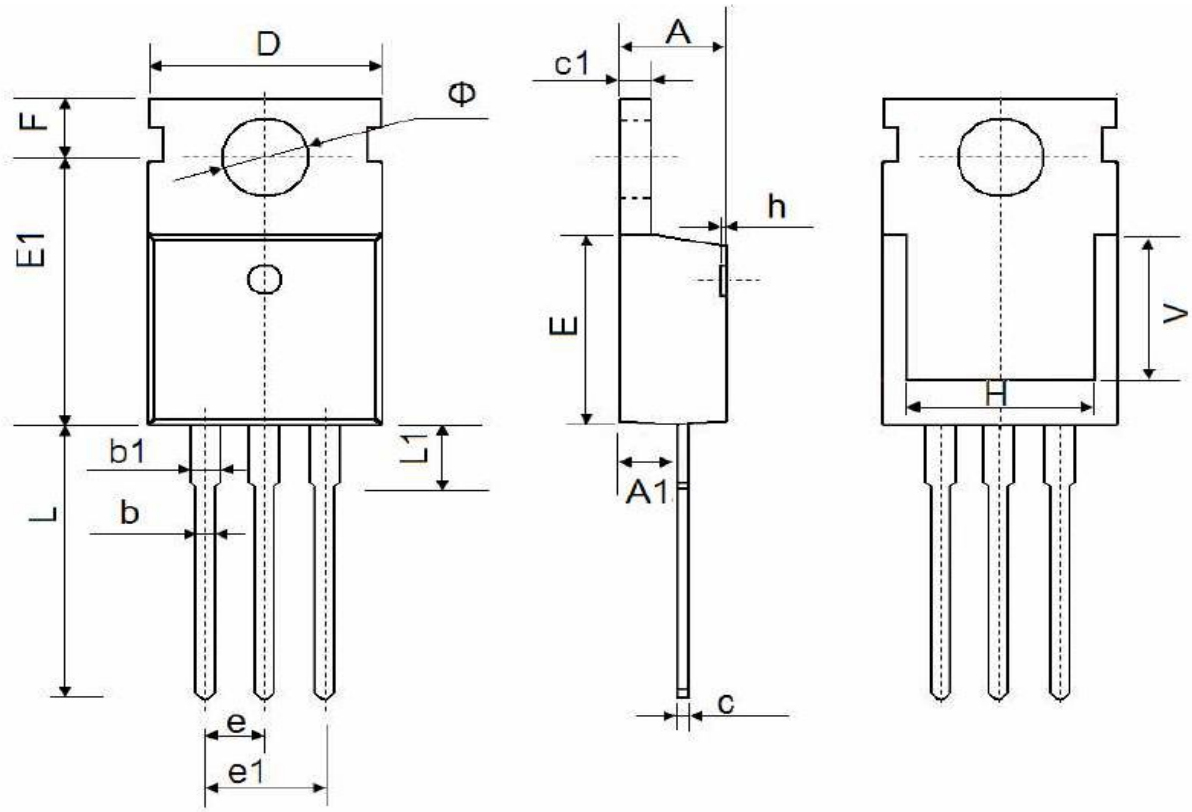
**Package Outline: TO-252-3L**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2	2.6	0.079	0.102
A1	0	0.15	0.000	0.006
A2	0.76	1.36	0.030	0.054
b	0.61	0.85	0.024	0.033
b1	0.71	0.91	0.028	0.036
b2	5.04	5.64	0.198	0.222
c	0.508 TYP.		0.02 TYP.	
c1	0.508 TYP.		0.02 TYP.	
D	5.7	6.3	0.224	0.248
D1	5	5.6	0.197	0.220
E	6.3	6.9	0.248	0.272
E1	4.55	5.15	0.179	0.203
e	2.286 TYP.		0.09 TYP.	
H	9.65	10.4	0.380	0.409
L	1.4	1.7	0.055	0.067
L1	2.90 REF.		0.114 REF.	
L2	0.75	1.35	0.030	0.053
L3	0.6	1.2	0.024	0.047
θ	0°	10°	0°	10°
θ1	5°	9°	5°	9°
θ2	25° REF.		25° REF.	



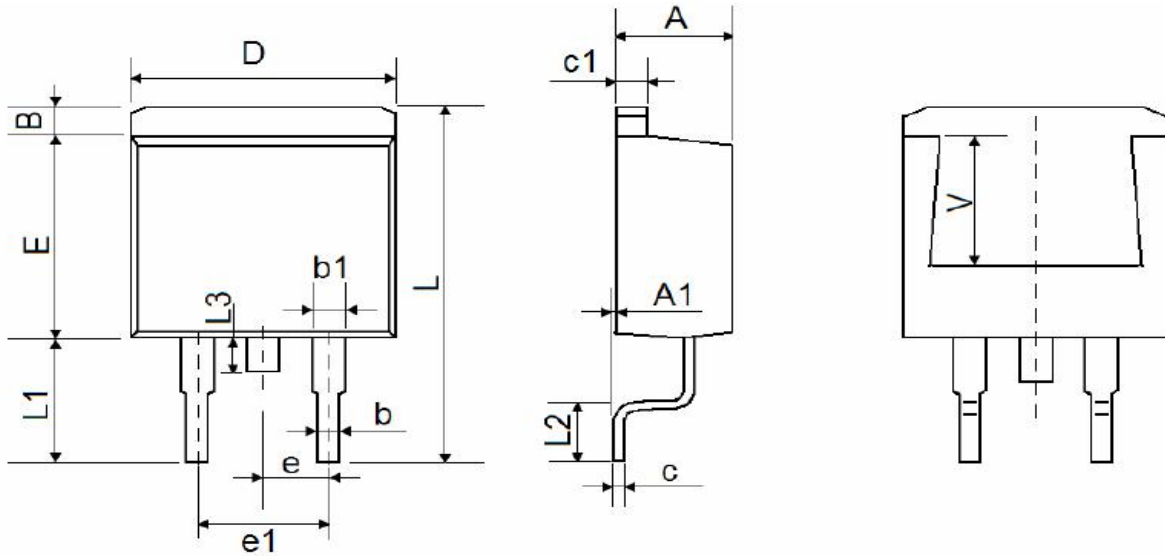
Package Outline: TO-220-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
A1	2.25	2.55	0.089	0.1
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	1.2	1.4	0.047	0.055
D	9.91	10.25	0.39	0.404
E	8.95	9.75	0.352	0.384
E1	12.65	12.95	0.498	0.51
e	2.540 Typ.		0.100 Typ.	
e1	4.98	5.18	0.196	0.204
F	2.65	2.95	0.104	0.116
H	7.9	8.1	0.311	0.319
h	0	0.3	0	0.012
L	12.9	13.4	0.508	0.528
L1	2.85	3.25	0.112	0.128
V	7.500 Ref.		0.295 Ref.	
Φ	3.4	3.8	0.134	0.15



Package Outline: TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.47	4.67	0.176	0.184
A1	0	0.15	0	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	8.5	8.9	0.335	0.35
e	2.540 Typ.		0.100 Typ.	
e1	4.98	5.18	0.196	0.204
L	15.05	15.45	0.593	0.608
L1	5.08	5.48	0.2	0.216
L2	2.34	2.74	0.092	0.108
L3	1.3	1.7	0.051	0.067
V	5.600 Ref.		0.220 Ref.	



## Revision History

Date	Rev	Description	Framer	Review	Approver
2019/12/02	1.1	Increase of TO-263,TO-220	Zhou Hui		