

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
650V	149mΩ@10V	28A

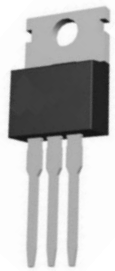
### Feature

- Optimized body diode reverse recovery performance
- Low on-resistance and low conduction losses
- Small package
- Ultra Low Gate Charge cause lower driving requirements

### Application

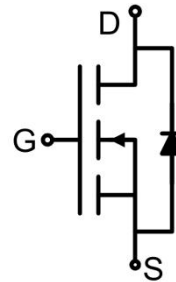
- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)
- LLC Half-bridge

### Package

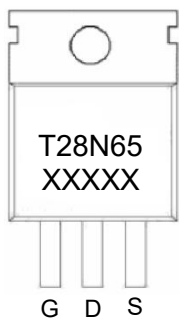


TO-220AB

### Circuit diagram



### Marking



### Absolute maximum ratings (T<sub>C</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	650	V
Gate-Source Voltage	V <sub>GS</sub>	±30	V
Continuous Drain Current	I <sub>D</sub>	28	A
Continuous Drain Current(T <sub>C</sub> =100°C)	I <sub>D</sub> (100°C)	18	A
Pulsed Drain Current <sup>1)</sup>	I <sub>DM</sub>	112	A
Power Dissipation	P <sub>D</sub>	260	W
Thermal Resistance,Junction-to-Case	R <sub>θJC</sub>	0.48	°C/W
Single pulse avalanche energy <sup>2)</sup>	E <sub>AS</sub>	676	mJ
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ +150	°C

### Electrical characteristics (T<sub>A</sub>=25 °C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	650			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> = 0V			3	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V			±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.6	3.5	4.3	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =14A		120	149	mΩ
<b>Dynamic characteristics<sup>3)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f =1.0MHz		2070		pF
Output Capacitance	C <sub>oss</sub>			120		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =28A		37.5		nC
Gate-Source Charge	Q <sub>gs</sub>			13		
Gate-Drain Charge	Q <sub>gd</sub>			11.5		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =380V, V <sub>GS</sub> =10V, I <sub>D</sub> =14A, R <sub>G</sub> =2.3Ω		14		nS
Turn-on rise time	t <sub>r</sub>			12		
Turn-off delay time	t <sub>d(off)</sub>			65		
Turn-off fall time	t <sub>f</sub>			11		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>S</sub>				28	A
Diode Forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =28A, T <sub>J</sub> =25°C		0.9	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> =14A di/dt = 100A/μs		190		nS
Reverse Recovery Charge	Q <sub>rr</sub>			2		μC
Peak Reverse Recovery Current	I <sub>rrm</sub>			21		A

Notes:

1) Repetitive Rating: Pulse width limited by maximum junction temperature

2) T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω

3) Guaranteed by design, not subject to production

## Typical Characteristics

Figure1. Safe operating area

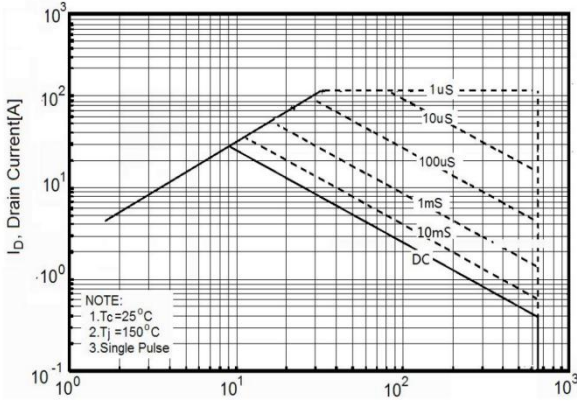


Figure2. Source-Drain Diode Forward Voltage

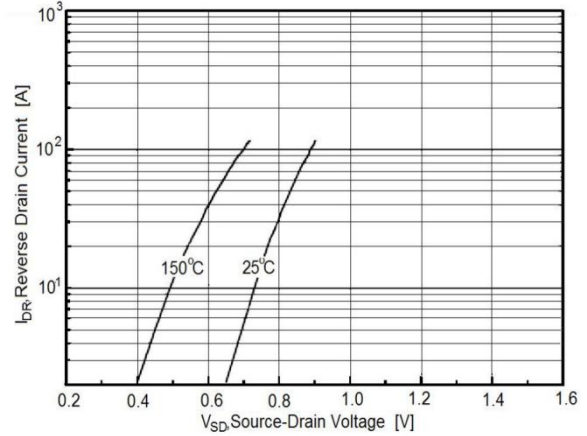


Figure3. Output characteristics

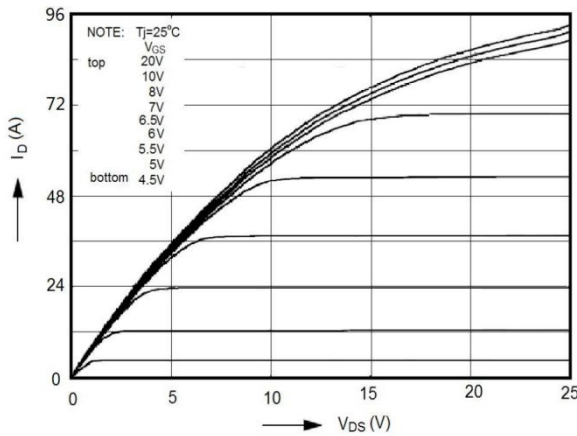


Figure4. Transfer characteristics

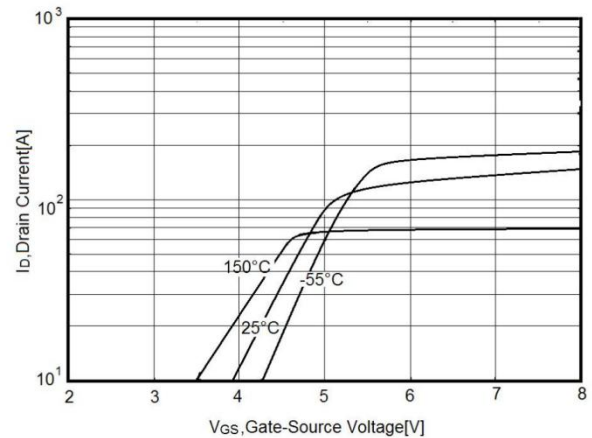


Figure5. Static drain-source on resistance

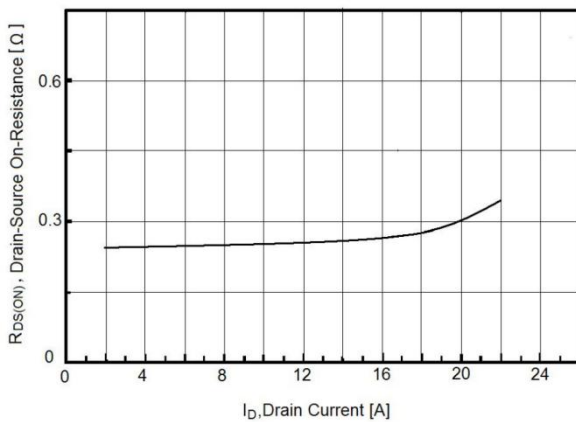
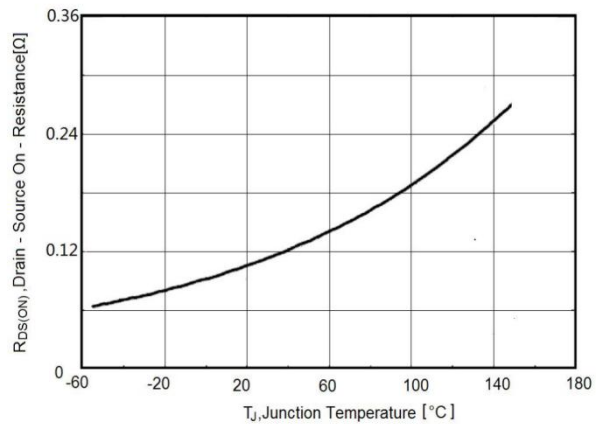


Figure6. RDS(ON) vs Junction Temperature



## Typical Characteristics

Figure7.  $BV_{DSS}$  vs Junction Temperature

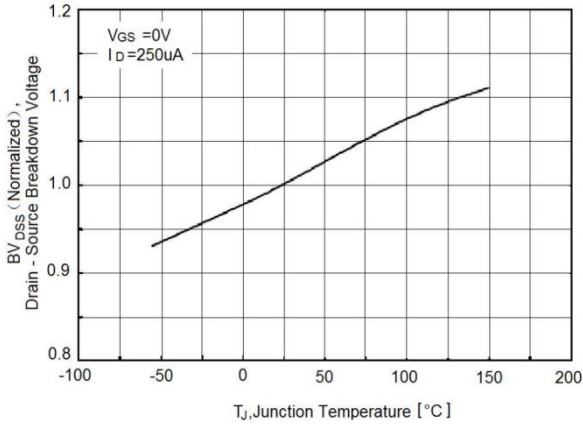


Figure8. Maximum  $I_D$  vs Junction Temperature

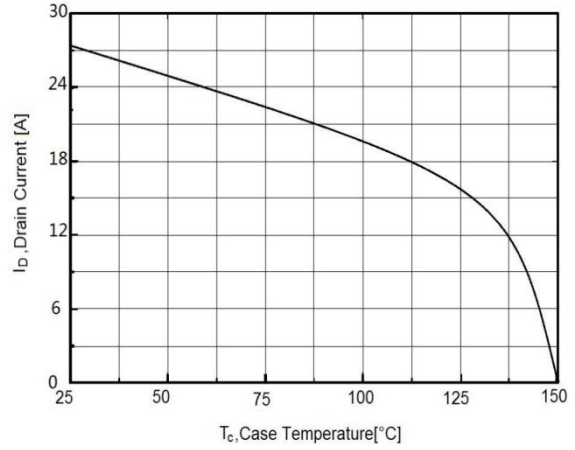


Figure9. Gate charge waveforms

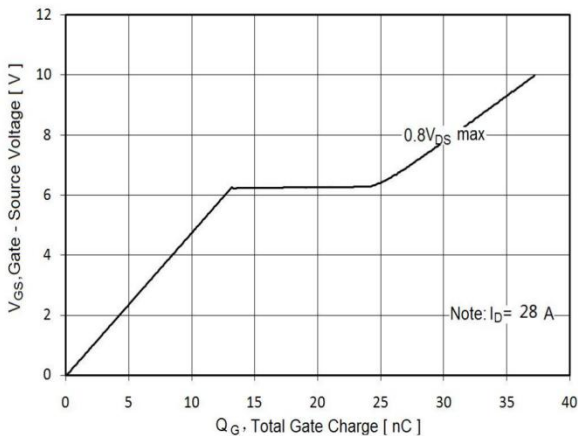


Figure10. Capacitance

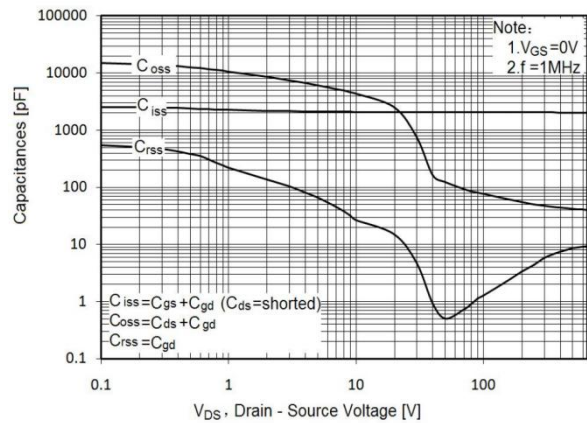
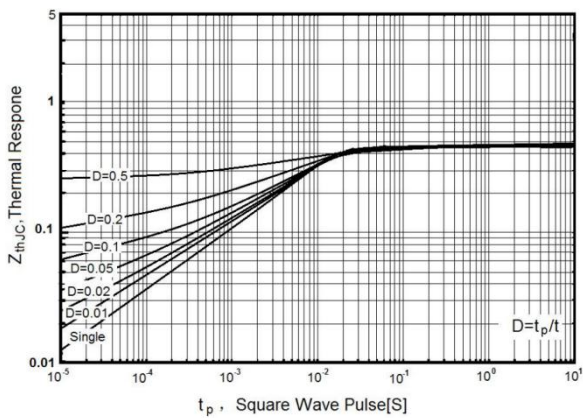
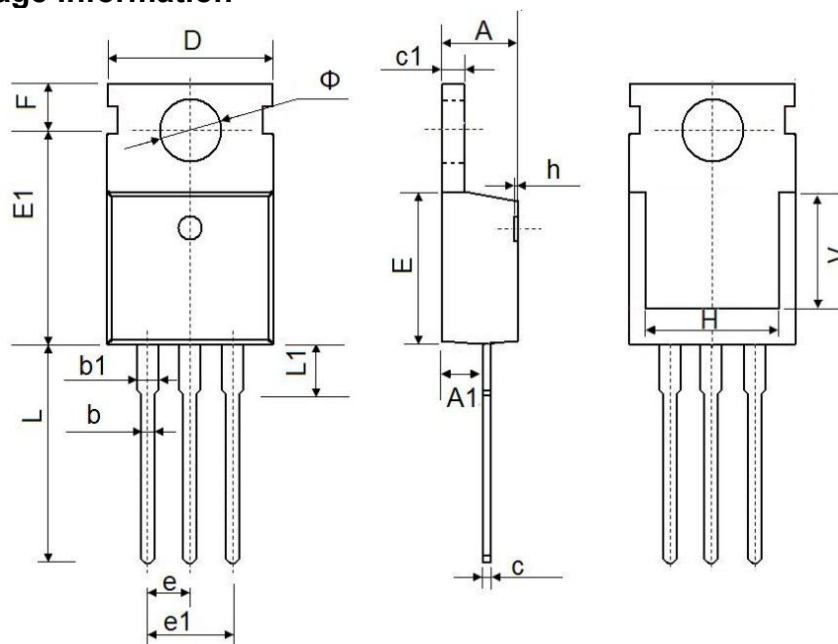


Figure11. Transient Thermal Impedance



### TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF		0.295 REF	
φ	3.400	3.800	0.134	0.150