

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_b$
650V	1.3Ω@10V	7A

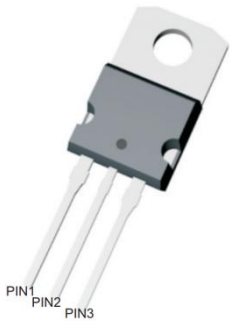
### Feature

- Fast switching capability
- Improved dv/dt capability, high ruggedness

### Application

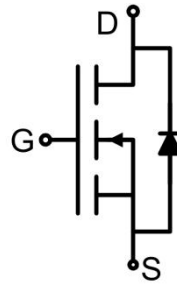
- Power switching application
- DC-DC Converter
- Power Management

### Package

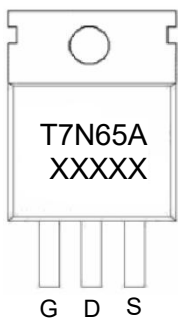


TO-220AB

### Circuit diagram



### Marking



### Absolute maximum ratings (T<sub>A</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(T <sub>C</sub> =25°C)	I <sub>D</sub>	7	A
Continuous Drain Current(T <sub>C</sub> =100°C)	I <sub>D</sub> (100°C)	4.5	A
Pulsed Drain Current <sup>2)</sup>	I <sub>DM</sub>	28	A
Power Dissipation	P <sub>D</sub>	46	W
Thermal Resistance,Junction-to-Case	R <sub>θJC</sub>	2.7	°C/W
Single pulse avalanche energy	E <sub>AS</sub>	281.3	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			1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, 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	2.0		4.0	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.5A		1.1	1.3	Ω
<b>Dynamic characteristics<sup>3)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f =1.0MHz		1080		pF
Output Capacitance	C <sub>oss</sub>			90		
Reverse Transfer Capacitance	C <sub>rss</sub>			2.5		
Total Gate Charge <sup>1)</sup>	Q <sub>g</sub>	V <sub>DS</sub> =520V, V <sub>GS</sub> =10V, I <sub>D</sub> =7A, I <sub>G</sub> =1mA <sup>1,2)</sup>		22		nC
Gate-Source Charge	Q <sub>gs</sub>			5		
Gate-Drain Charge	Q <sub>gd</sub>			5.5		
Turn-on delay time <sup>1)</sup>	t <sub>d(on)</sub>	V <sub>DS</sub> =325V, V <sub>GS</sub> =10V, I <sub>D</sub> =7A, R <sub>G</sub> =25Ω <sup>1,2)</sup>		12		nS
Turn-on rise time	t <sub>r</sub>			20		
Turn-off delay time	t <sub>d(off)</sub>			74		
Turn-off fall time	t <sub>f</sub>			33		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>S</sub>				7	A
Diode Forward voltage <sup>1)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =7A			1.4	V
Reverse Recovery Time <sup>1)</sup>	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =7A, di/dt=100A/μs		506		nS
Reverse Recovery Charge	Q <sub>rr</sub>			2.7		μC

Notes:

- 1) Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
- 2) Essentially independent of operating temperature.
- 3) Guaranteed by design, not subject to production.

## Typical Characteristics

Fig.1 Drain Current vs. Gate-Source Voltage

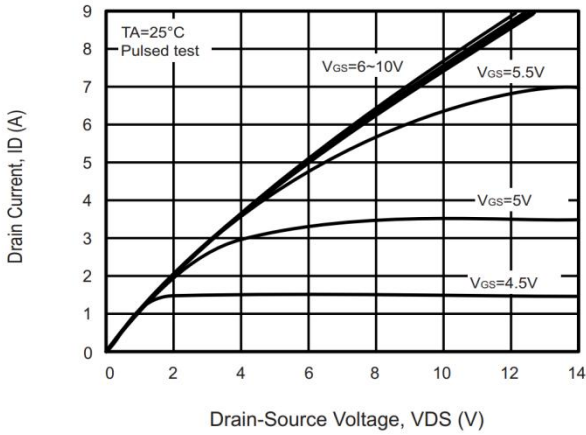


Fig.2 Drain-Source On-Resistance vs. Gate-Source Voltage

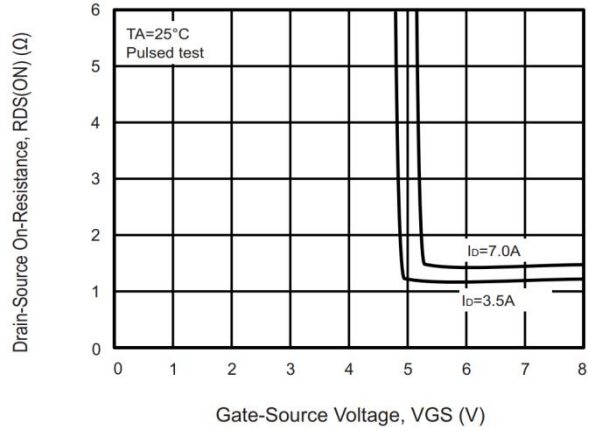


Fig.3 Gate Charge Characteristics

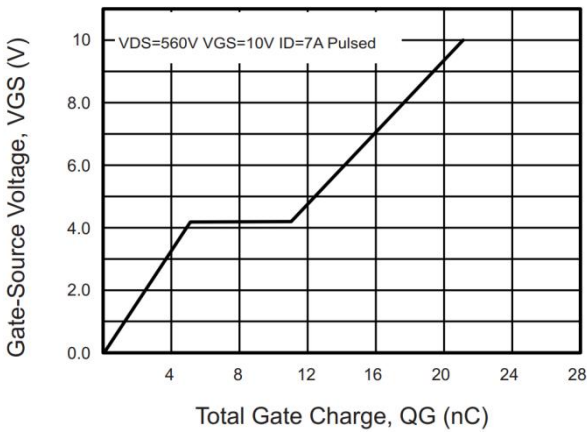


Fig.4 Capacitance Characteristics

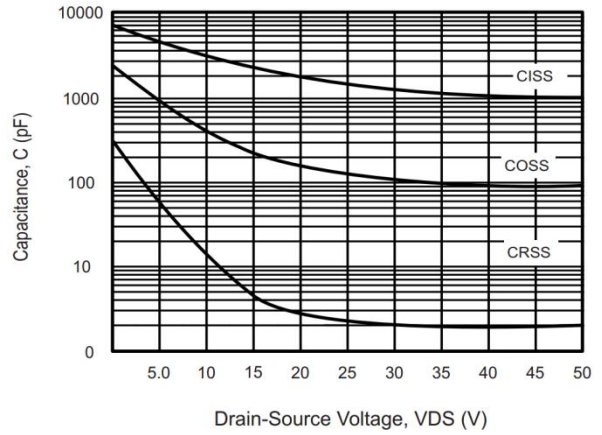


Fig.5 Drain-Source On-Resistance vs. Junction Temperature

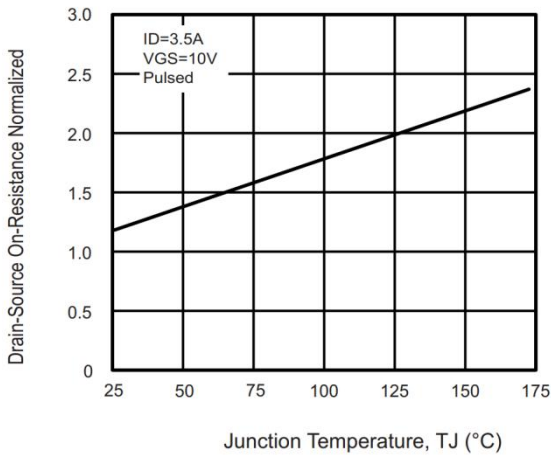
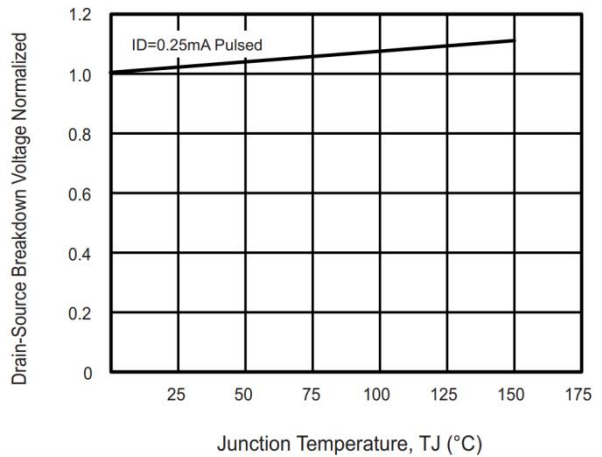


Fig.6 Breakdown Voltage vs. Junction Temperature



## Typical Characteristics

Fig.7 Gate Threshold Voltage vs. Junction Temperature

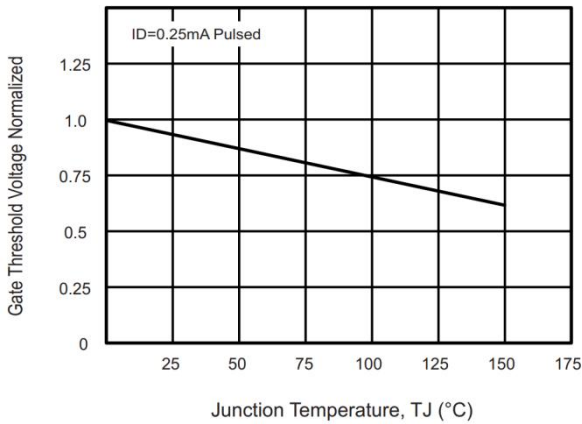


Fig.8 Source Current vs. Source-Drain Voltage

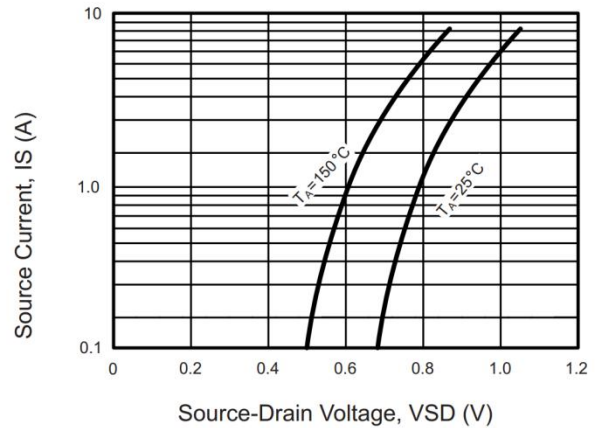


Fig.9 Drain Current vs. Gate-Source Voltage

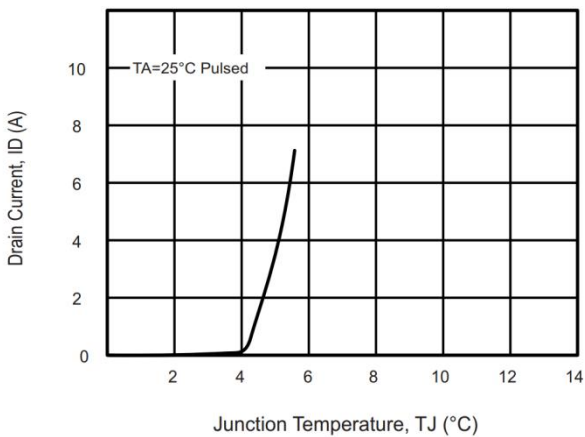


Fig.10 Drain-Source On-Resistance vs. Drain Current

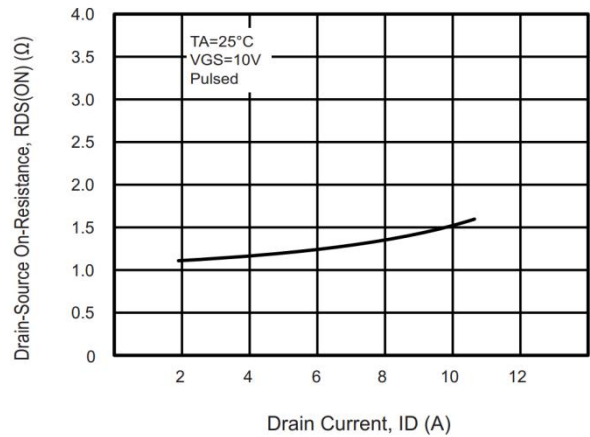


Fig.11 Power Dissipation vs. Junction Temperature

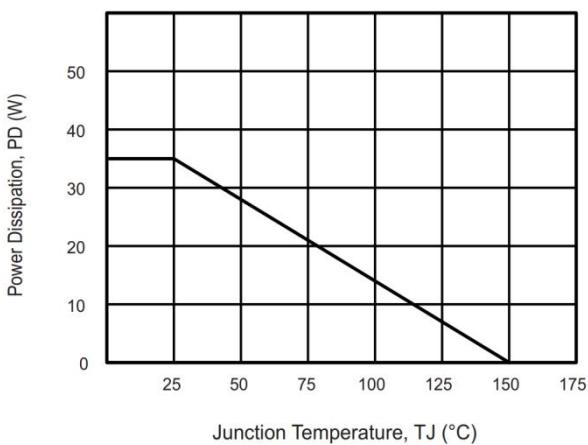
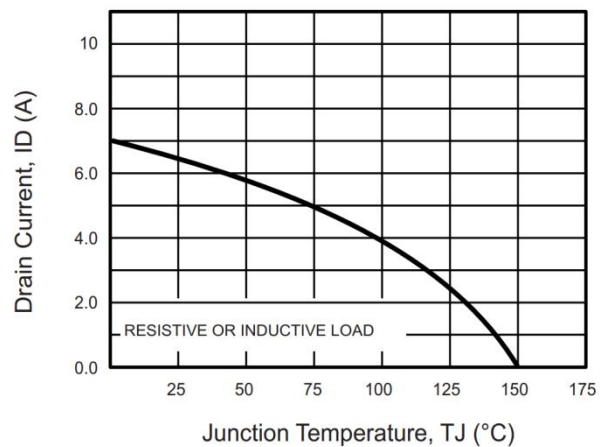
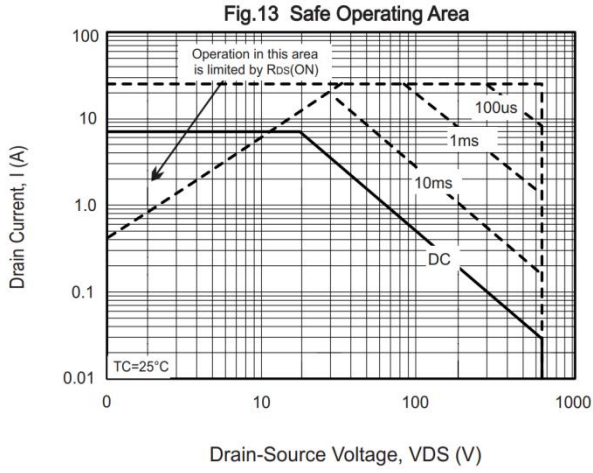


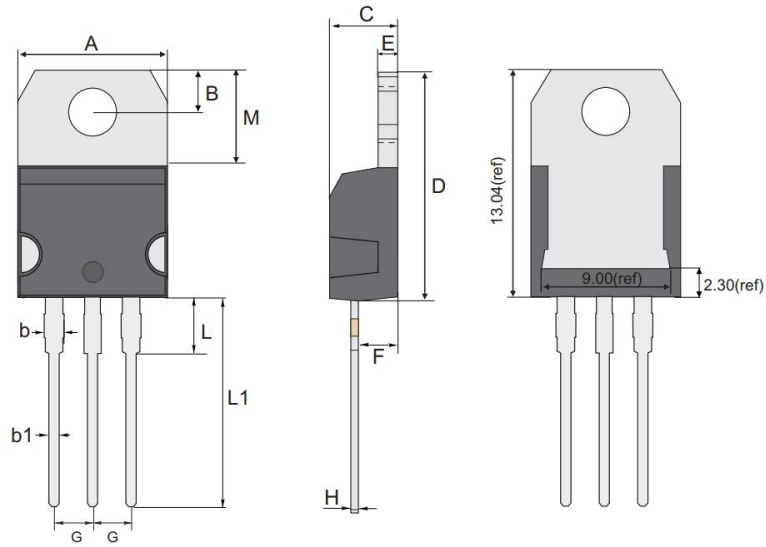
Fig.12 Drain Current vs. Junction Temperature



## Typical Characteristics



### TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	10.080	10.280	0.397	0.405
B	2.640	2.840	0.104	0.112
b	1.180	1.480	0.046	0.058
b1	0.700	0.900	0.028	0.035
C	4.250	4.650	0.167	0.183
D	15.140	15.540	0.596	0.612
E	1.170	1.370	0.046	0.054
F	2.390	2.790	0.094	0.110
G	2.440	2.640	0.096	0.104
H	0.400	0.600	0.016	0.024
L	3.480	3.880	0.137	0.153
L1	12.730	13.130	0.501	0.517
M	5.990	6.390	0.236	0.252