

HIGH-TEMPERATURE, 80mΩ HIGH-VOLTAGE N-CHANNEL DEPLETION JFET

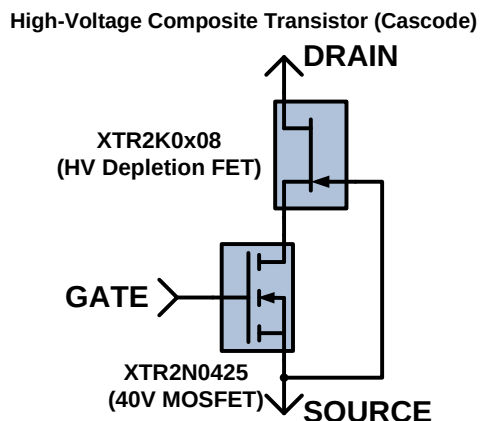
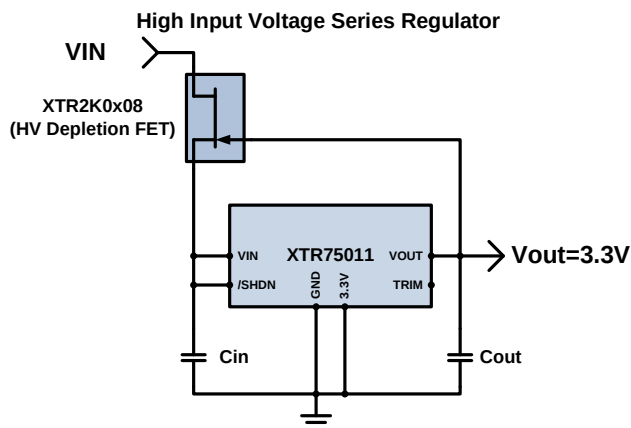
FEATURES

- ▲ Minimum $BV_{DSS} > 650V$.
- ▲ Allowed V_{GS} range $-15V$ to $+2V$.
- ▲ Operational beyond the $-60^{\circ}C$ to $+230^{\circ}C$ temperature range.
- ▲ Low $R_{DS(on)}$
 - XTR2K0x08: 290 mΩ @ $230^{\circ}C$
- ▲ Maximum I_D :
 - XTR2K0208: 2A @ $230^{\circ}C$ (package limited)
 - XTR2K0308: 15A @ $230^{\circ}C$
- ▲ On-time ($t_{d(on)} + t_r$):
 - XTR2K0x08: 55nsec @ $230^{\circ}C$
- ▲ Off-time ($t_{d(off)} + t_f$):
 - XTR2K0x08: 65nsec @ $230^{\circ}C$
- ▲ Ruggedized 3-lead TO257, 8-lead side brazed DIP and 8-lead SOIC-like with ePAD.

APPLICATIONS

- ▲ Reliability-critical, Automotive, Aeronautics & Aerospace, Down-hole.
- ▲ Voltage regulation, voltage clamping, power switching, motor control, power inverters.

PRODUCT HIGHLIGHT



ORDERING INFORMATION

X
↓
Source:
X = X-REL Semi

TR
↓
Process:
TR = HiTemp, HiRel
R = HiRel

2K
↓
Part family

0x08
↓
Part number

Product Reference	Max VDS	Temperature Range	Package	Pin Count	Marking
XTR2K0208-D	150V	$-60^{\circ}C$ to $+230^{\circ}C$	Ceramic side Braze DIP	8	XTR2K0208
XTR2K0208-FE	150V	$-60^{\circ}C$ to $+230^{\circ}C$	Gull-wing flat pack with ePad	8	XTR2K0208
XTR2K0308-T	300V	$-60^{\circ}C$ to $+230^{\circ}C$	TO-257AA	3	XTR2K0308

Other packages and packaging configurations possible upon request. For some packages or packaging configurations, MOQ may apply.

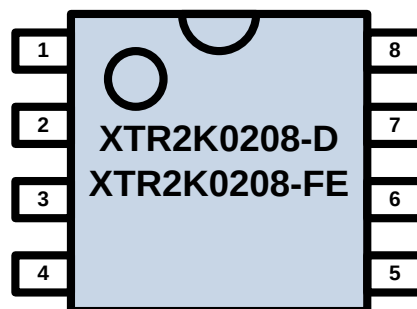
ABSOLUTE MAXIMUM RATINGS

Drain-source voltage	
XTR2K0208	0V to +150V
XTR2K0308	0V to +650V
Gate-source voltage	-20V to +3V
Storage temperature range	-70°C to +230°C
Operating junction temperature range	-70°C to +250°C
ESD classification	2kV HBM MIL-STD-750

Caution: Stresses beyond those listed in “ABSOLUTE MAXIMUM RATINGS” may cause permanent damage to the device. These are stress ratings only and functionality of the device at these or any other condition beyond those indicated in the operational sections of the specifications is not implied. Exposure to “ABSOLUTE MAXIMUM RATINGS” conditions for extended periods may permanently affect device reliability.

PRODUCT VARIANTS
TO-257
Front view


1 DRAIN
2 SOURCE
3 GATE
Case Floating

DIP8 / CDFP8
Top view


1, 2, 3 SOURCE
4 GATE
5, 6, 7, 8 DRAIN
ePAD of CDFP8 SOURCE

THERMAL CHARACTERISTICS

Parameter	Condition	Min	Typ	Max	Units
XTR2K0308-T (TO257)					
Thermal Resistance: J-C $R_{Th\ J-C}$			5		°C/W
Thermal Resistance: J-A $R_{Th\ J-A}$	Still air.		50		°C/W
XTR2K0208-D (DIP8)					
Thermal Resistance: J-C $R_{Th\ J-C}$			20		°C/W
Thermal Resistance: J-A $R_{Th\ J-A}$	Still air.		100		°C/W
XTR2K0208-FE (DFP8 with exposed pad)					
Thermal Resistance: J-C $R_{Th\ J-C}$	Measured on ePAD.		7		°C/W
Thermal Resistance: J-A $R_{Th\ J-A}$	ePAD thermally connected to 3cm ² PCB copper		70		°C/W

RECOMMENDED OPERATING CONDITIONS

Parameter	Min	Typ	Max	Units
Drain-source voltage V_{DS} XTR2K0208 XTR2K0308	0		150 300	V
Gate-source voltage V_{GS}	-15		+2	V
Junction Temperature ¹ T_j	-60		230	°C

¹ Operation beyond the specified temperature range is achieved.

XTR2K0208 SPECIFICATIONS

Unless otherwise stated, specification applies for $-60^{\circ}\text{C} < T_j < 230^{\circ}\text{C}$.

Parameter	Condition	Min	Typ	Max	Units
DC Characteristics					
Maximum Continuous Drain-source Voltage V_{DS_Max}	$V_{GS}=-15V$	150			V
Static Drain-source On-state Resistance $R_{DS(on)}$	$V_{GS}=0V, I_{DS}=2A$ $T_C=85^{\circ}C$ $T_C=230^{\circ}C$		110 270	180 350	$m\Omega$
Continuous Drain Current $I_{D(DC)}$	$V_{GS}=+2V$ for TO-257 $T_J\leq 150^{\circ}C$ $T_J=230^{\circ}C$	2.5 2.0			A
Gate Threshold Voltage $V_{GS(th)}$	$V_{DS}=5V, I_{DS}=50mA$	-10	-6	-4	V
Temperature Drift of Gate Threshold Voltage $\Delta V_{GS(TH)}$	$60^{\circ}C<T_J<230^{\circ}C$			200	mV
Off-state Drain Current I_{DSS}	$V_{DS}=150V, V_{GS}=-15V$ $T_C=85^{\circ}C$ $T_C=230^{\circ}C$		0.02 10	0.1 50	μA
Reverse Gate Leakage Current I_{GSSR}	$V_{GS}=-15V$ $T_C=85^{\circ}C$ $T_C=230^{\circ}C$		0.1 2	1 15	μA
Forward Gate Leakage Current I_{GSSF}	$V_{GS}=2V$ $T_C=85^{\circ}C$ $T_C=230^{\circ}C$		0.1 50	0.5 150	mA
AC Characteristics					
Input Capacitance C_{iss}	$V_{DS}=100V, V_{GS}=-15V, f=100kHz$		500		pF
Output Capacitance C_{oss}			95		pF
Transfer Capacitance C_{rss}			95		pF
Switching Characteristics					
Pulsed Drain Current I_{DM}	$V_{GS\ sweep}=-15\ to\ +2V, \tau=1ms$ $T_C\leq 150^{\circ}C$ $T_C=230^{\circ}C$	4 3			A
Total Gate Charge Q_g	$V_{DS}=150V, V_{GS\ sweep}=-15\ to\ +2V$		62		nC
Turn-on Delay Time $t_{d(on)}$	$V_{DS}=150V, V_{GS\ sweep}=-15\ to\ 2V, R_{G_Ext}=2.5\Omega.$ Inductive load		12		ns
Rise time t_r			35		
Turn-off Delay Time $t_{d(off)}$			25		
Fall Time t_f			29		
Turn-on Energy E_{ON}			230		μJ
Turn-off Energy E_{OFF}			180		

XTR2K0308 SPECIFICATIONS

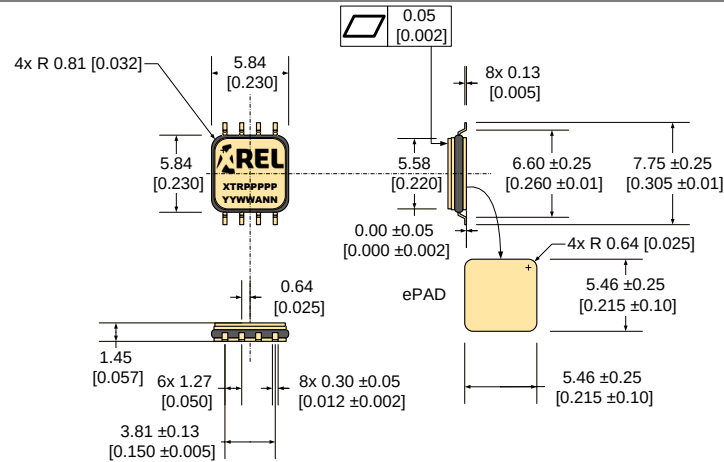
Unless otherwise stated, specification applies for $-60^{\circ}\text{C} < T_J < 230^{\circ}\text{C}$.

Parameter	Condition	Min	Typ	Max	Units	
DC Characteristics						
Maximum Continuous Drain-source Voltage V_{DS_Max}	$V_{GS}=-15V$	300			V	
Static Drain-source On-state Resistance $R_{DS(on)}$	$V_{GS}=0V, I_{DS}=2A$ $T_C=85^{\circ}C$ $T_C=230^{\circ}C$		110 270	180 350	$m\Omega$	
Continuous Drain Current $I_{D(DC)}$	$V_{GS}=+2V$ for TO-257 $T_J\leq150^{\circ}C$ $T_J=230^{\circ}C$	10 5			A	
Gate Threshold Voltage $V_{GS(th)}$	$V_{DS}=5V, I_{DS}=50mA$	-10	-6	-4	V	
Temperature Drift of Gate Threshold Voltage $\Delta V_{GS(TH)}$	$60^{\circ}C<T_J<230^{\circ}C$			200	mV	
Off-state Drain Current I_{DSS}	$V_{DS}=150V, V_{GS}=-15V$ $T_C=85^{\circ}C$ $T_C=230^{\circ}C$		0.2 100	1 500	μA	
Reverse Gate Leakage Current I_{GSSR}	$V_{GS}=-15V$ $T_C=85^{\circ}C$ $T_C=230^{\circ}C$		0.1 2	1 15	μA	
Forward Gate Leakage Current I_{GSSF}	$V_{GS}=2V$ $T_C=85^{\circ}C$ $T_C=230^{\circ}C$		0.1 50	0.5 150	mA	
AC Characteristics						
Input Capacitance C_{iss}	$V_{DS}=100V, V_{GS}=-15V, f=100kHz$		500		pF	
Output Capacitance C_{oss}			95		pF	
Transfer Capacitance C_{rss}			95		pF	
Switching Characteristics						
Pulsed Drain Current I_{DM}	$V_{GS\ sweep}=-15\ to\ +2V, \tau=1ms$ $T_C\leq150^{\circ}C$ $T_C=230^{\circ}C$	25 20			A	
Total Gate Charge Q_g	$V_{DS}=300V, V_{GS\ sweep}=-15\ to\ +2V$		65		nC	
Turn-on Delay Time $t_{d(on)}$	$V_{DS}=300V, V_{GS\ sweep}=-15\ to\ 2V, R_{G_Ext}=2.5\Omega.$ Inductive load		12		ns	
Rise time t_r			35			
Turn-off Delay Time $t_{d(off)}$			25			
Fall Time t_f			29			
Turn-on Energy E_{ON}				230		μJ
Turn-off Energy E_{OFF}				180		

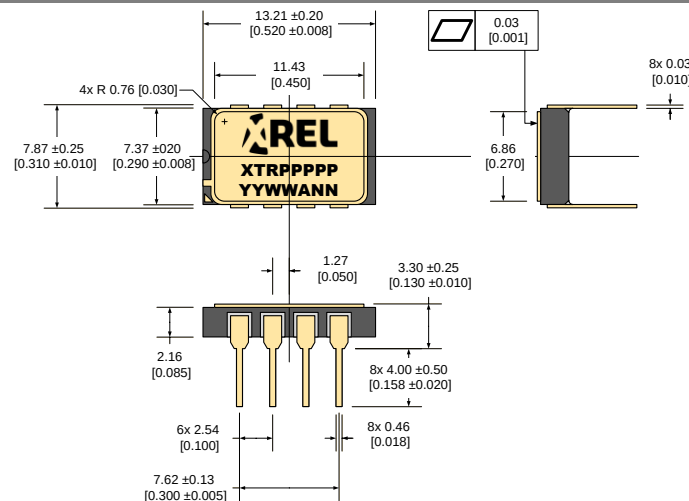
PACKAGE OUTLINES

Dimensions shown in mm [inches]. Tolerances ± 0.13 mm [± 0.005 in] unless otherwise stated.

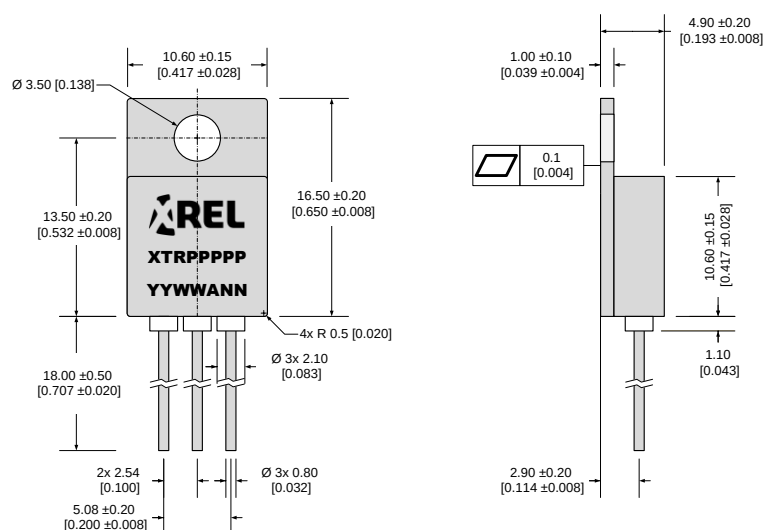
Ceramic Gull-wing Flat pack with ePad DFP8



Ceramic Side Brazed Dual In-line DIP8



TO-257AA (TO-220M)



Part Marking Convention

Part Reference: XTRPPPPPP	
XTR	X-REL Semiconductor, high-temperature, high-reliability product (XTRM Series).
PPPPP	Part number (0-9, A-Z).
Unique Lot Assembly Code: YYWWANN	
YY	Two last digits of assembly year (e.g. 15 = 2015).
WW	Assembly week (01 to 52).
A	Assembly location code.
NN	Assembly lot code (01 to 99).

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- ✓ Information: info@x-relsemi.com
- ✓ Support: support@x-relsemi.com

X-REL Semiconductor

90, Avenue Léon Blum
38100 Grenoble
France