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°C to +230°C temperature range.
- ▲ Low $R_{DS(on)}$
  - ○ XTR2K0x08: 290 mΩ @ 230°C
- ▲ Maximum I_D:
  - ○ XTR2K0208: 2A @ 230°C (package limited)
  - ○ XTR2K0308: 15A @ 230°C
- ▲ On-time ($t_{d(on)}$+t_r):
  - ○ XTR2K0x08: 55nsec @ 230°C
- ▲ Off-time ($t_{d(off)}$+t_f):
  - ○ XTR2K0x08: 65nsec @ 230°C
- ▲ Ruggedized 3-lead TO257, 8-lead side brazed DIP and 8-lead SOIC-like with ePAD.

APPLICATIONS

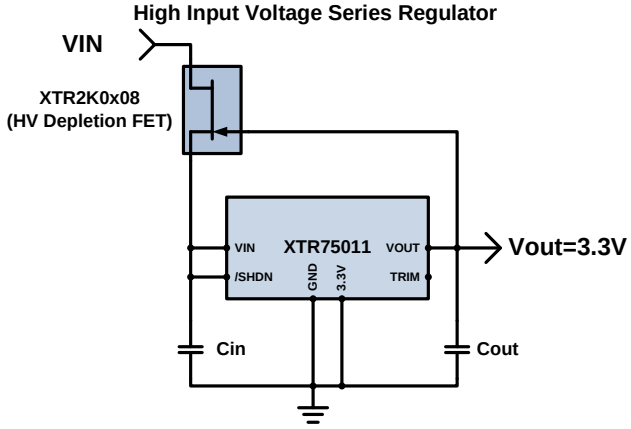
- ▲ Reliability-critical, Automotive, Aeronautics & Aerospace, Down-hole.
- ▲ Voltage regulation, voltage clamping, power switching, motor control, power inverters.

DESCRIPTION

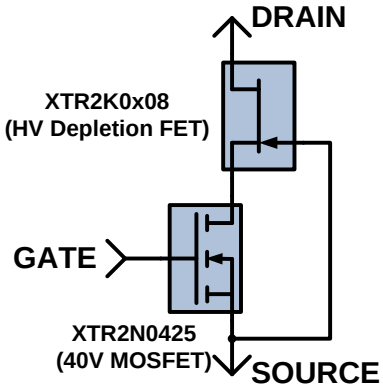
XTR2K0x08 is a family of 80mΩ depletion jFETs with maximum operation voltages between 150V and 300V designed to reliably operate from -60°C to +230°C, with junction temperature able to reach +250°C.
Fabricated on a Silicon Carbide (SiC) process, XTR2K0x08 parts offer reduced leakage currents while offering low $R_{DS(on)}$ and gate charge (Q_g). These features allow XTR2K0x08 parts to be ideally suited for linear as well as for switching applications.
Parts from the XTR2K0x08 family are available in ruggedized 3-lead TO257, 8-lead side brazed DIP and 8-lead SOIC-like with ePAD.

PRODUCT HIGHLIGHT

High Input Voltage Series Regulator



High-Voltage Composite Transistor (Cascode)



ORDERING INFORMATION

X	TR	2K	0x08
Source: X = X-REL Semi	Process: TR = HiTemp, HiRel R = HiRel	Part family	Part number

Product Reference	Max VDS	Temperature Range	Package	Pin Count	Marking
XTR2K0208-D	150V	-60°C to +230°C	Ceramic side Braze DIP	8	XTR2K0208
XTR2K0208-FE	150V	-60°C to +230°C	Gull-wing flat pack with ePad	8	XTR2K0208
XTR2K0308-T	300V	-60°C to +230°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

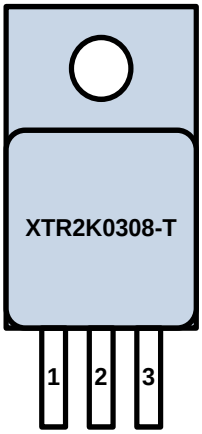
Drain-source voltage	
XTR2K0208	0V to +150V
XTR2K0308	0V to +650V
Gate-source voltage	-20V to +3V
Storage temperature range	-70°C to +230°C
Operating junction temperature range	-70°C to +250°C
ESD classification	2kV HBM MIL-STD-750

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

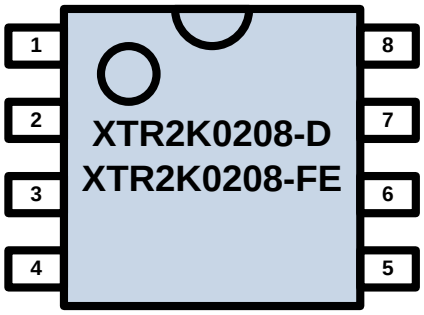
Front view



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 $R_{Th\_J\text{-}C}$			5		°C/W
Thermal Resistance: J-A $R_{Th\_J\text{-}A}$	Still air.		50		°C/W
XTR2K0208-D (DIP8)					
Thermal Resistance: J-C $R_{Th\_J\text{-}C}$			20		°C/W
Thermal Resistance: J-A $R_{Th\_J\text{-}A}$	Still air.		100		°C/W
XTR2K0208-FE (DFP8 with exposed pad)					
Thermal Resistance: J-C $R_{Th\_J\text{-}C}$	Measured on ePAD.		7		°C/W
Thermal Resistance: J-A $R_{Th\_J\text{-}A}$	ePAD thermally connected to 3cm² 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°C<T_j<230°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°C T_C=230°C		110 270	180 350	mΩ
Continuous Drain Current $I_{D(DC)}$	V_{GS}=+2V for TO-257 T_J≤150°C T_J=230°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°C<T_j<230°C			200	mV
Off-state Drain Current I_{DSS}	V_{DS}=150V, V_{GS}=-15V T_C=85°C T_C=230°C		0.02 10	0.1 50	µA
Reverse Gate Leakage Current I_{GSSR}	V_{GS}=-15V T_C=85°C T_C=230°C		0.1 2	1 15	µA
Forward Gate Leakage Current I_{GSSF}	V_{GS}=2V T_C=85°C T_C=230°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, τ=1ms T_C≤150°C T_C=230°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}=2.5Ω. 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

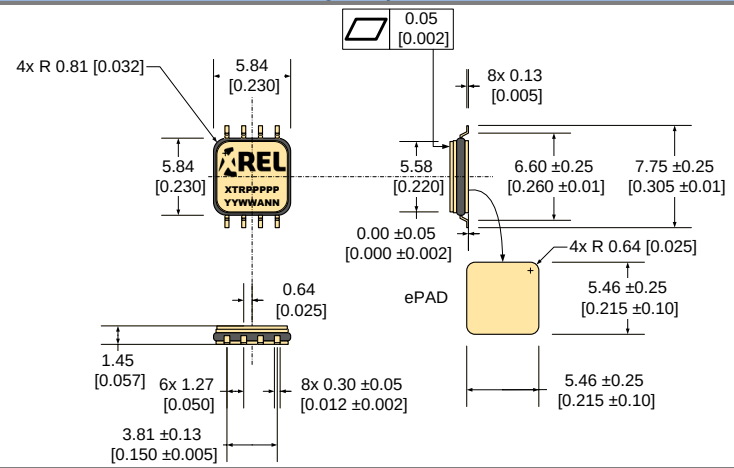
Unless otherwise stated, specification applies for -60°C<T_j<230°C.

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°C T_C=230°C		110 270	180 350	mΩ
Continuous Drain Current **$I_{D(DC)}$**	V_{GS}=+2V for TO-257 T_J≤150°C T_J=230°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°C<T_j<230°C			200	mV
Off-state Drain Current **I_{DSS}**	V_{DS}=150V, V_{GS}=-15V T_C=85°C T_C=230°C		0.2 100	1 500	µA
Reverse Gate Leakage Current **I_{GSSR}**	V_{GS}=-15V T_C=85°C T_C=230°C		0.1 2	1 15	µA
Forward Gate Leakage Current **I_{GSSF}**	V_{GS}=2V T_C=85°C T_C=230°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, τ=1ms T_C≤150°C T_C=230°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}=2.5Ω. 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		

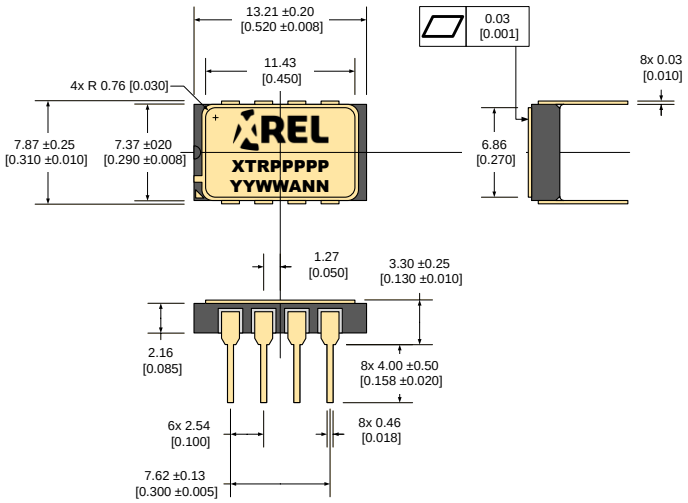
PACKAGE OUTLINES

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

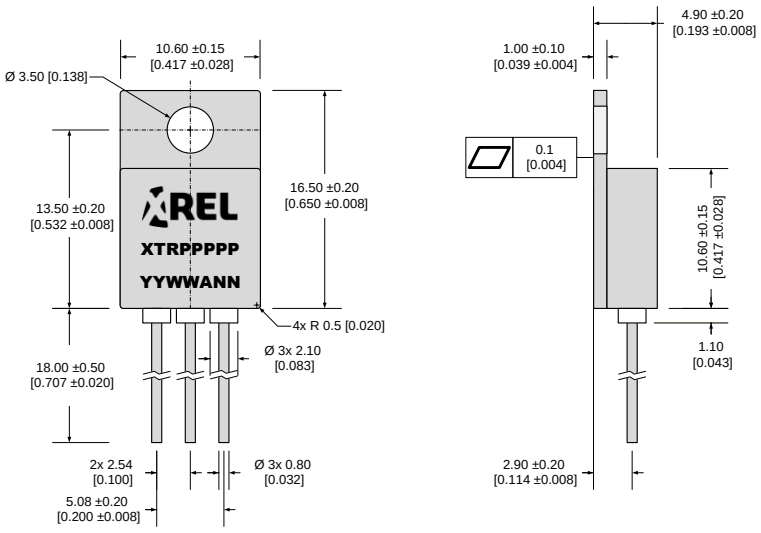
Ceramic Gull-wing Flat pack with ePad DFP8



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).

IMPORTANT NOTICE & DISCLAIMER

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