

HiPerFET™

Power MOSFETs

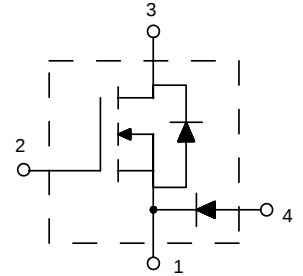
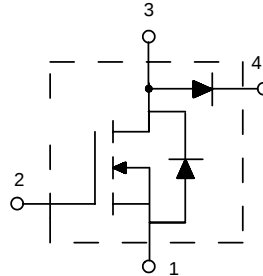
IXFN44N50U2 IXFN44N50U3

IXFN48N50U2 IXFN48N50U3

V_{DSS}	I_D (cont)	$R_{DS(on)}$	t_{rr}
500 V	44 A	0.12 Ω	35 ns
500 V	48 A	0.10 Ω	35 ns

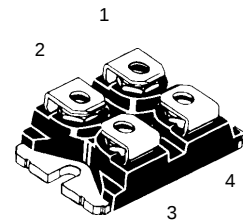
Buck & Boost Configurations for PFC & Motor Control Circuits

Preliminary data



Symbol	Test Conditions	Maximum Ratings
HiPerFET MOSFET	V_{DSS} $T_J = 25^\circ\text{C}$ to 150°C	500 V
	V_{DGR} $T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1\text{ M}\Omega$	500 V
	V_{GS} Continuous	± 20 V
	V_{GSM} Transient	± 30 V
	I_{D25} $T_C = 25^\circ\text{C}$	44N50 44 A 48N50 48 A
	I_{DM} $T_C = 25^\circ\text{C}$, pulse width limited by max. T_{JM}	44N50 176 A 48N50 192 A
	I_{AR} $T_C = 25^\circ\text{C}$	24 A
	E_{AR} Repetitive	30 mJ
	dv/dt $I_S \leq I_{DM}$, $-di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 2\text{ }\Omega$	5 V/ns
	P_D $T_C = 25^\circ\text{C}$	520 W
DIODE	V_{RRM}	600 V
	I_{FAVM} $T_C = 70^\circ\text{C}$; rectangular, $d = 0.5$	60 A
	I_{FRM} $t_p < 10\text{ }\mu\text{s}$; pulse width limited by T_J	800 A
	P_D $T_C = 25^\circ\text{C}$	180 W
CASE	T_J	-40 ... +150 $^\circ\text{C}$
	T_{JM}	150 $^\circ\text{C}$
	T_{stg}	-40 ... +150 $^\circ\text{C}$
	V_{ISOL} 50/60 Hz, RMS $t = 1\text{ min}$ $I_{ISOL} \leq 1\text{ mA}$ $t = 1\text{ s}$	2500 V~ 3000 V~
	M_d Mounting torque Terminal connection torque (M4)	1.5/13 Nm/lb.in. 1.5/13 Nm/lb.in.
Weight		30 g

miniBLOC, SOT-227 B



Features

- Popular Buck & Boost circuit topologies
- International standard package miniBLOC SOT-227B
- Aluminium nitride isolation - high power dissipation
- Isolation voltage 3000 V~
- Low $R_{DS(on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Low drain-to-case capacitance (<60 pF) - reduced RFI
- Ultra-fast FRED diode with soft reverse recovery

Applications

- Power factor controls and buck regulators
- DC servo and robotic drives
- DC choppers
- Switch reluctance motor controls

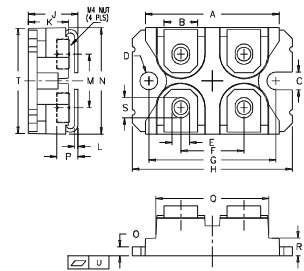
Advantages

- Easy to mount with 2 screws
- Space savings
- Tightly coupled FRED

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
V_{DSS}	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 8\text{ mA}$	2		4 V
I_{GSS}	$V_{GS} = \pm 20\text{ V}_{DC}, V_{DS} = 0$			± 200 nA
I_{DSS}	$V_{DS} = 0.8\text{ V}_{DSS}$ $V_{GS} = 0\text{ V}$	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		400 μA 2 mA
$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 0.5\text{ I}_{D25}$ Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle $\delta \leq 2\%$	44N50 48N50		0.12 Ω 0.10 Ω

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
g_{fs}	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ I}_{D25}$, pulse test	22	42	S
C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		8400	pF
C_{oss}			900	pF
C_{rss}			280	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5\text{ V}_{DSS}, I_D = 0.5\text{ I}_{D25}$ $R_G = 1\text{ }\Omega$ (External)		30	ns
t_r			60	ns
$t_{d(off)}$			100	ns
t_f			30	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5\text{ V}_{DSS}, I_D = 0.5\text{ I}_{D25}$		270	nC
Q_{gs}			60	nC
Q_{gd}			135	nC
R_{thJC}		0.24		K/W
R_{thCK}		0.05		K/W

Ultra-fast Diode		Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
Symbol	Test Conditions	min.	typ.	max.
I_R	$T_J = 25^\circ\text{C}; V_R = V_{RRM}$			200 μA
	$V_R = 0.8\text{ V}_{RRM}$			100 μA
	$T_J = 125^\circ\text{C}; V_R = 0.8\text{ V}_{RRM}$			14 mA
V_F	$I_F = 70\text{ A}, V_{GS} = 0\text{ V}, T_J = 150^\circ\text{C}$			1.5 V
	Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle $\delta \leq 2\%$ $T_J = 25^\circ\text{C}$			1.8 V
t_{rr}	$I_I = 1\text{ A}, di/dt = -200\text{ A}/\mu\text{s}, V_R = 30\text{ V}, T_J = 25^\circ\text{C}$		35	50 ns
I_{RM}	$I_F = 60\text{ A}, di/dt = -480\text{ A}/\mu\text{s}, V_R = 350\text{ V}, T_J = 100^\circ\text{C}$		19	21 A
R_{thJC}			0.05	0.7 K/W
R_{thJK}				K/W

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M4 screws (4x) supplied

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	38.00	38.23	1.496	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.76	0.84	0.030	0.033
M	12.60	12.85	0.496	0.506
N	25.15	25.42	0.990	1.001
O	1.98	2.13	0.078	0.084
P	4.95	5.97	0.195	0.235
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.174
S	4.72	4.85	0.186	0.191
T	24.59	25.07	0.968	0.987
U	-0.05	0.1	-0.002	0.004

Fig.1 Output Characteristics

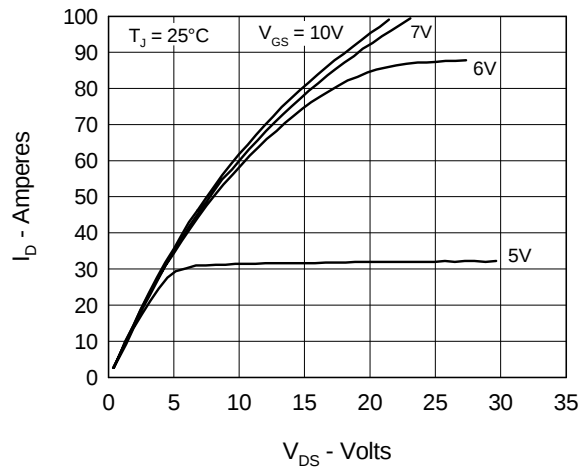


Fig.2 Input Admittance

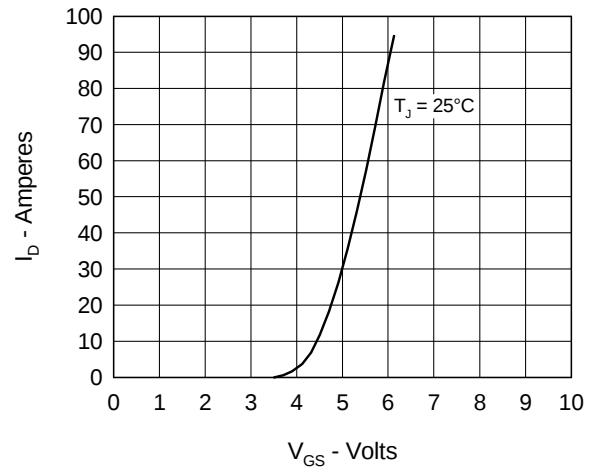
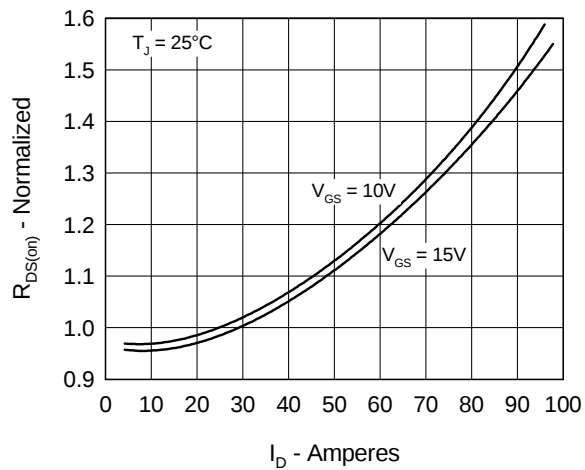

Fig.3 $R_{DS(on)}$ vs. Drain Current


Fig.4 Temperature Dependence of Drain to Source Resistance

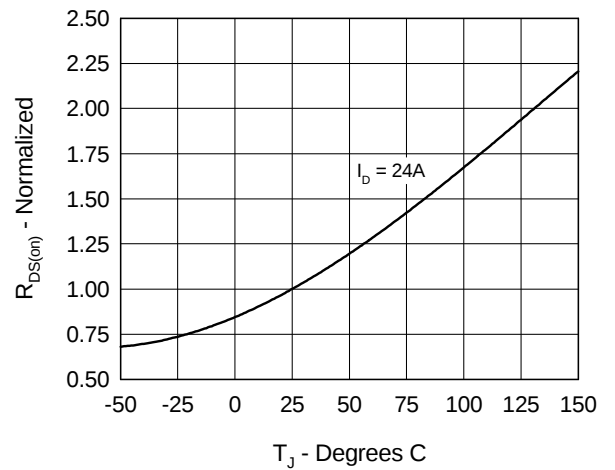


Fig.5 Drain Current vs. Case Temperature

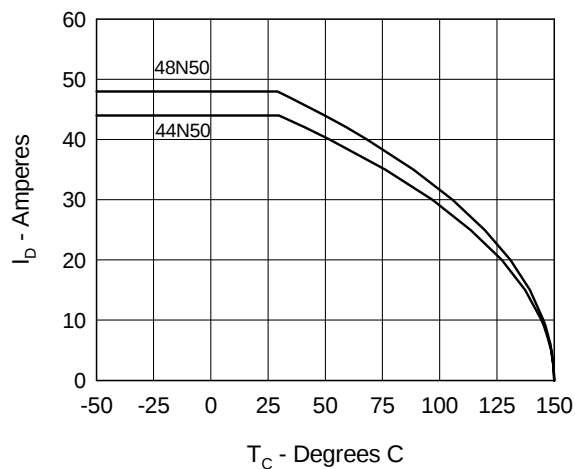


Fig.6 Temperature Dependence of Breakdown and Threshold Voltage

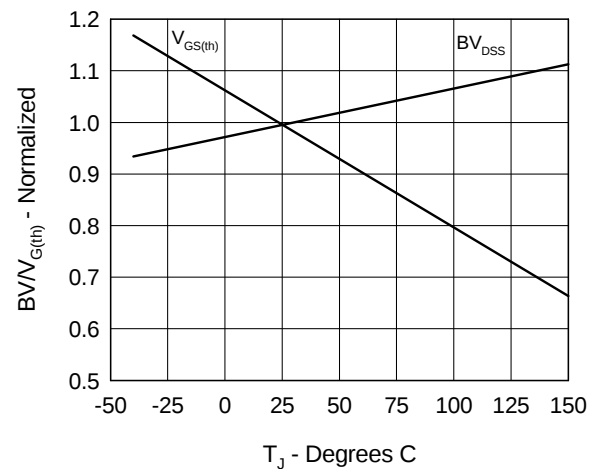


Fig.7 Gate Charge Characteristic Curve

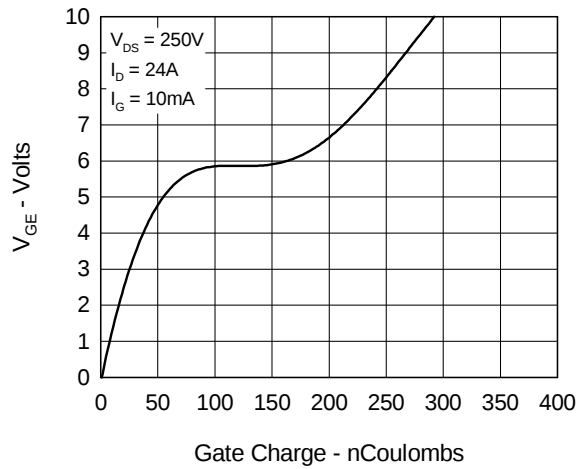


Fig.8 Capacitance Curves

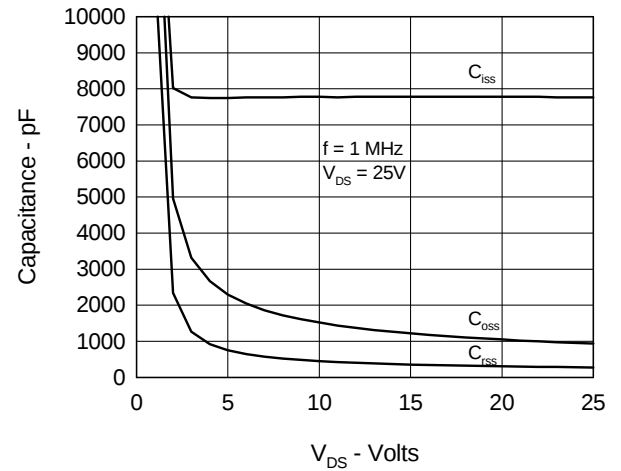


Fig.9 Source Current vs. Source to Drain Voltage

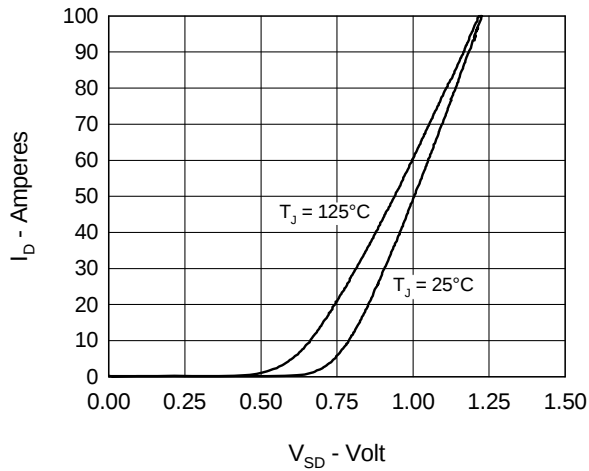
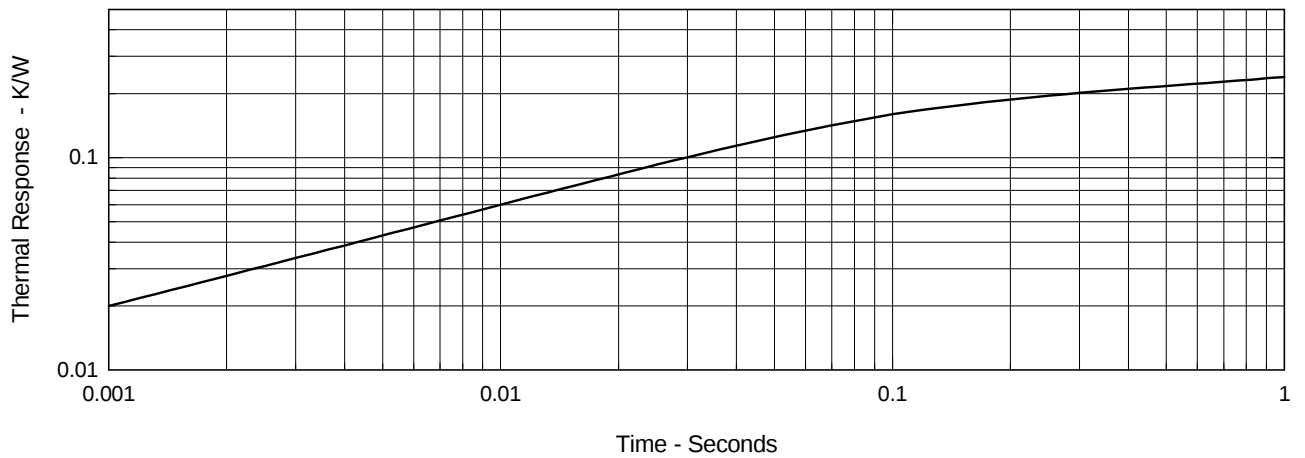


Fig.10 Transient Thermal Impedance



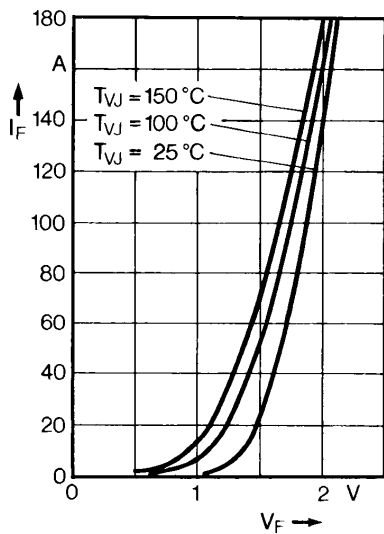


Fig. 11. Forward voltage drop.

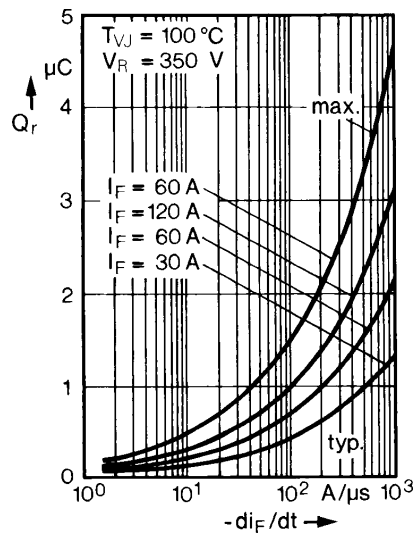


Fig. 12. Recovery charge versus $-di_F/dt$.

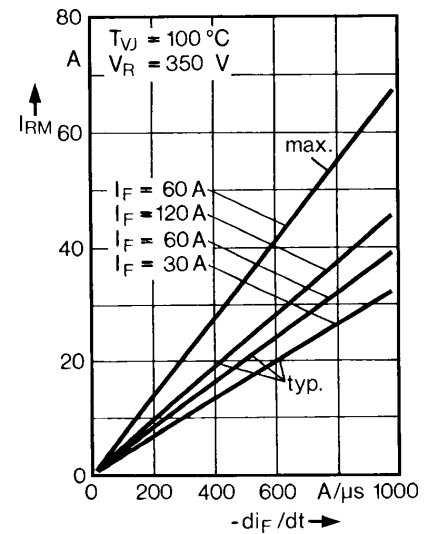


Fig. 13. Peak reverse current vs. $-di_F/dt$.

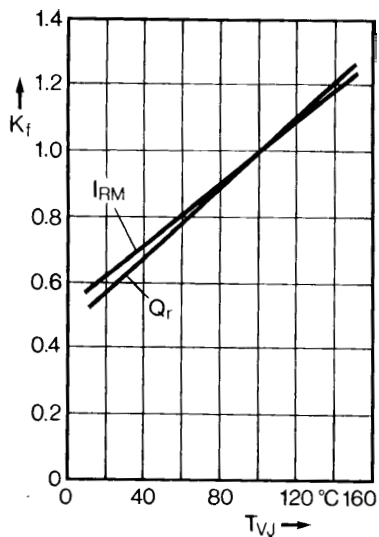


Fig. 14. Dynamic parameters versus junction temperature.

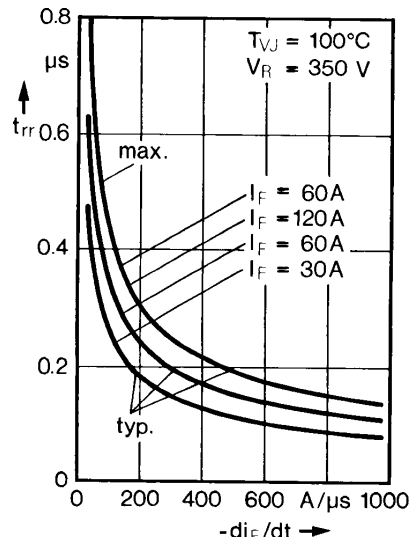


Fig. 15. Recovery time versus $-di_F/dt$.

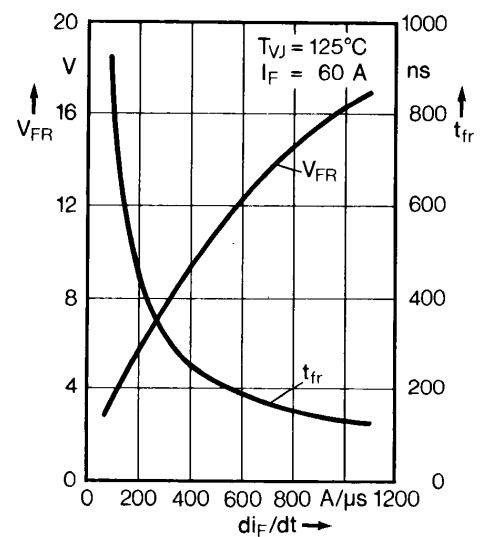


Fig. 16. Peak forward voltage and forward recovery time vs. di_F/dt .

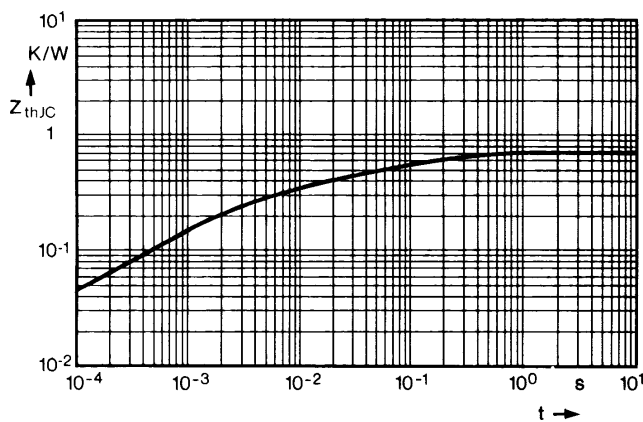


Fig. 17. Transient thermal impedance junction to case.