

60V N-ch Power MOSFET

General Features

- Proprietary New Trench Technology
- $R_{DS(ON),typ.} = 2.6m\Omega @ V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

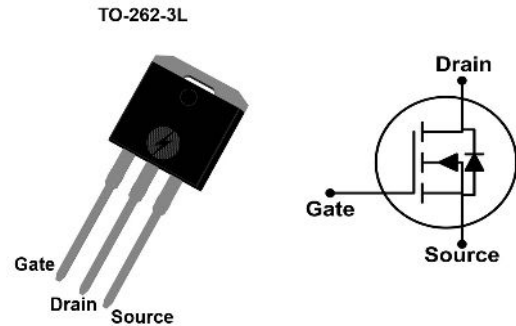
BV_{DSS}	$R_{DS(ON),max.}$	$I_D^{[2]}$
60V	3.2m Ω	200A

Applications

- High efficiency DC/DC Converters
- Synchronous Rectification
- UPS Inverter

Ordering Information

Part Number	Package	Marking
MXP60F3P2AE	TO-262-3L	MXP60F3P2AE



Absolute Maximum Ratings

$T_C=25^\circ C$ unless otherwise specified

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-to-Source Voltage ^[1]	60	V
V_{GSS}	Gate-to-Source Voltage	± 20	
I_D	Continuous Drain Current ^[2]	200	A
	Continuous Drain Current ^[3]	192	
	Continuous Drain Current at $T_C=100^\circ C$ ^[2]	141	
I_{DM}	Pulsed Drain Current at $V_{GS}=10V$ ^[2,4]	798	
E_{AS}	Single Pulse Avalanche Energy ($V_{DD}=30V, V_{GS}=10V, R_G=25\Omega, L=1mH$)	377	mJ
P_D	Power Dissipation	278	W
	Derating Factor above $25^\circ C$	1.9	W/ $^\circ C$
T_L	Soldering Temperature	300	$^\circ C$
	Distance of 1.6mm from case for 10 seconds		
T_J & T_{STG}	Operating and Storage Temperature Range	-55 to 175	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case			0.54	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient			63	

Electrical Characteristics

OFF Characteristics

 $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	60			V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current			1	μA	$V_{DS}=48V, V_{GS}=0V$
I_{GSS}	Gate-to-Source Leakage Current			± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$

ON Characteristics

 $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	2.6	3.2	m Ω	$V_{GS}=10V, I_D=80A^{[5]}$
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	$V_{DS} = V_{GS}, I_D=250\mu A$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance		6.2		nF	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$
C_{rSS}	Reverse Transfer Capacitance		0.22			
C_{oss}	Output Capacitance		0.86			
R_g	Gate Series Resistance		2.5		Ω	$f=1.0MHz$
Q_g	Total Gate Charge		109		nC	$V_{DD}=30V, I_D=192A, V_{GS}=10V$
Q_{gs}	Gate-to-Source Charge		34			
Q_{gd}	Gate-to-Drain (Miller) Charge		33			

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on Delay Time		21		ns	$V_{DD}=30V, I_D=187A, V_{GS}=10V, R_G=2.5\Omega$
t_{rise}	Rise Time		16			
$t_{d(off)}$	Turn-off Delay Time		71			
t_{fall}	Fall Time		16			

Source-Drain Body Diode Characteristics

 $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current ^[2]			200	A	Maximum Ratings
V_{SD}	Diode Forward Voltage		0.9	1.2	V	$I_S=80A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time		55		ns	$V_{GS}=0V, I_F=20A, di/dt=100A/\mu s$
Q_{rr}	Reverse Recovery Charge		115		nC	

Note:

 [1] $T_J=25^\circ\text{C}$ to 175°C

[2] Silicon limited current only

[3] Package limited current

[4] Repetitive rating, pulse width limited by maximum junction temperature

 [5] Pulse width $\leq 380\mu s$; duty cycle $\leq 2\%$

Typical Characteristics

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

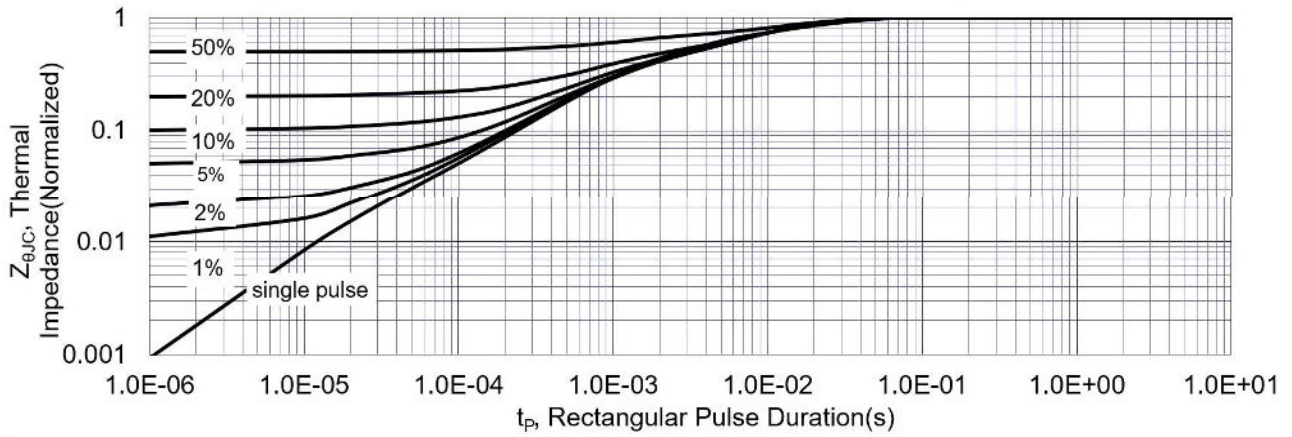


Figure 2. Maximum Power Dissipation vs. Case Temperature

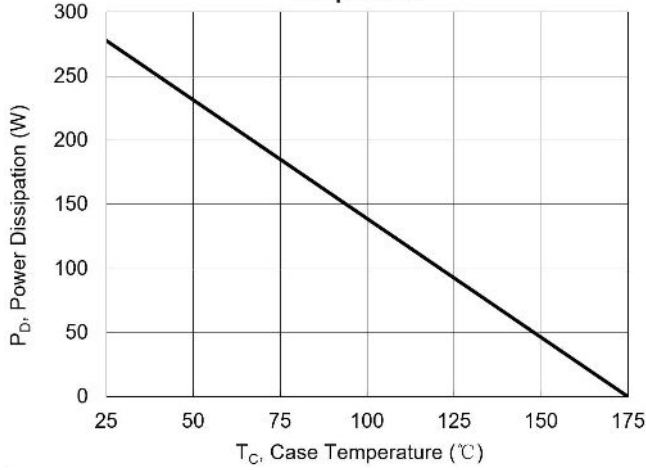


Figure 3. Maximum Continuous Drain Current vs Case Temperature

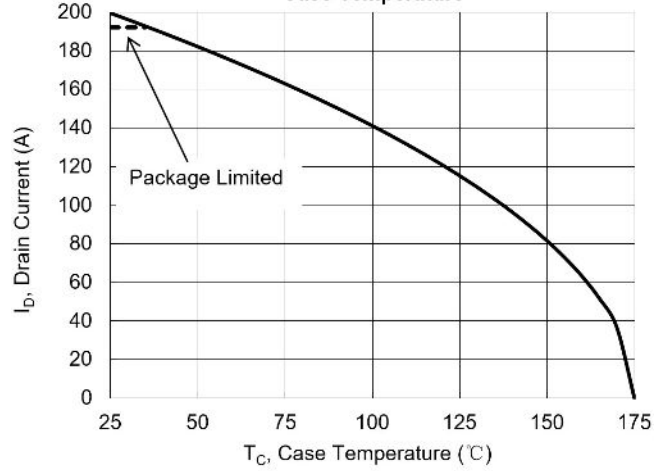


Figure 4. Typical Output Characteristics

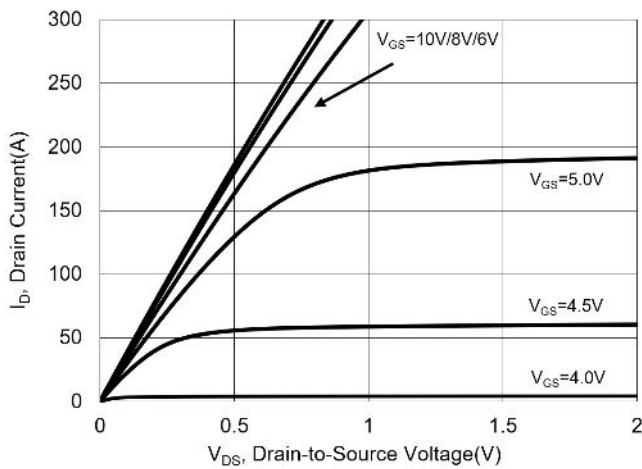


Figure 5. Typical Drain-to-Source ON Resistance vs. Gate Voltage

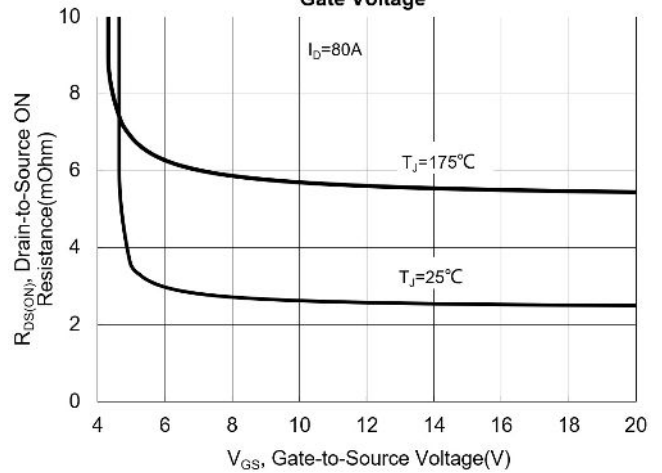


Figure 6. Maximum Peak Current Capability

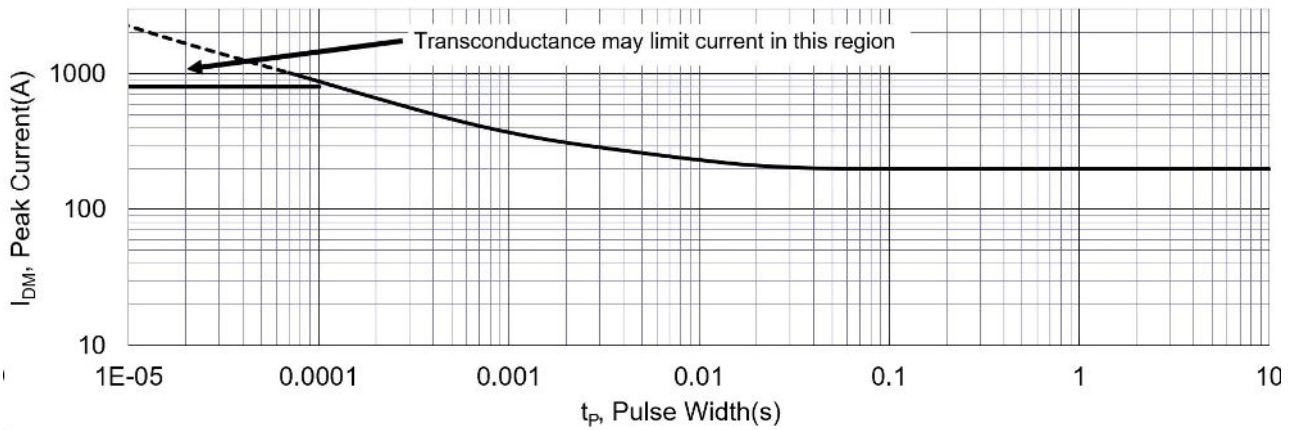


Figure 7. Typical Transfer Characteristics

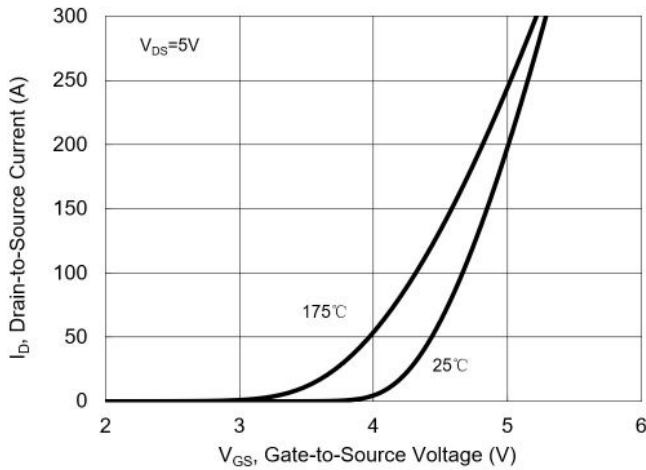


Figure 8. Unclamped Inductive Switching Capability

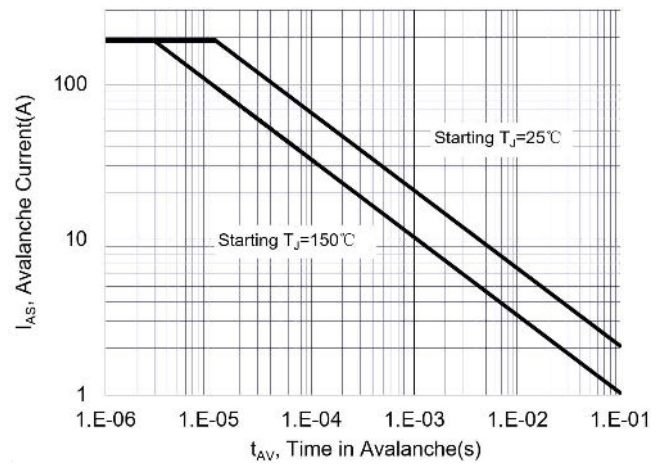


Figure 9. Typical Drain-to-Source ON Resistance

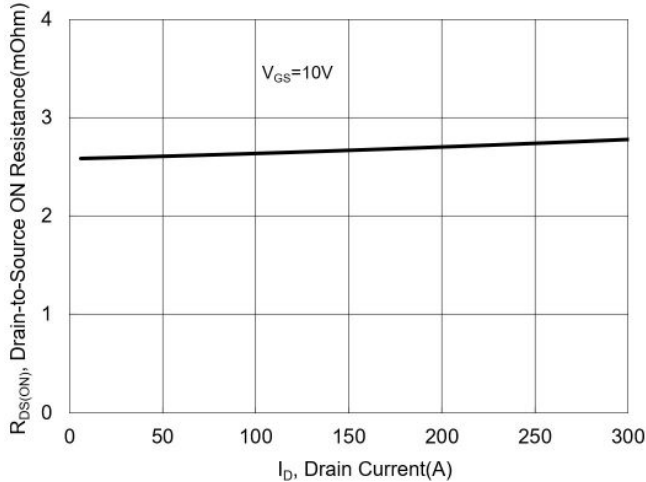


Figure 10. Typical Drain-to-Source On Resistance vs. Junction Temperature

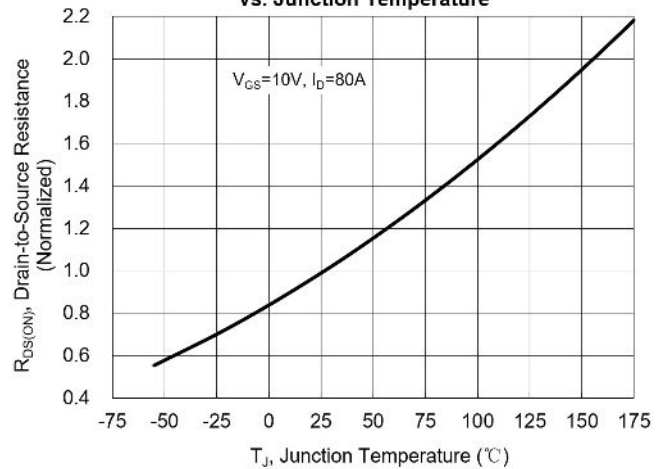


Figure 11. Typical Breakdown Voltage vs. Junction Temperature

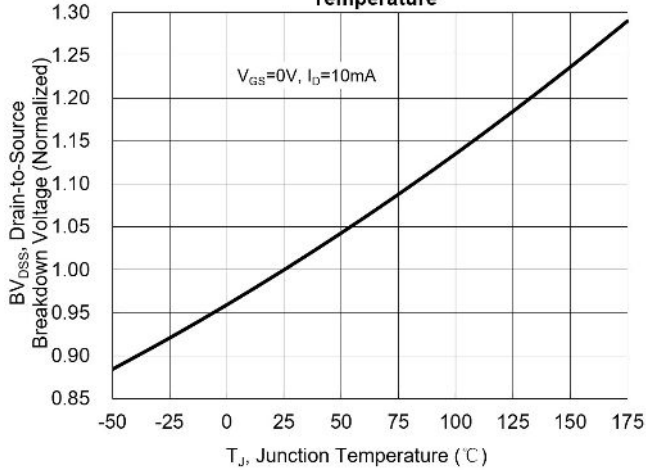


Figure 12. Typical Threshold Voltage vs. Junction Temperature

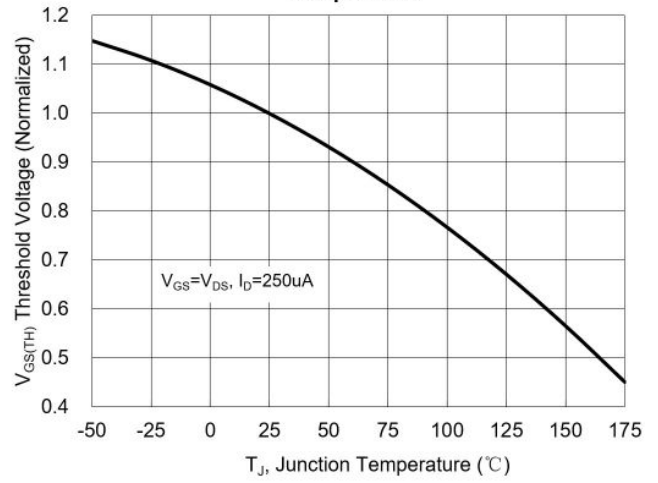


Figure 13. Maximum Forward Safe Operation Area

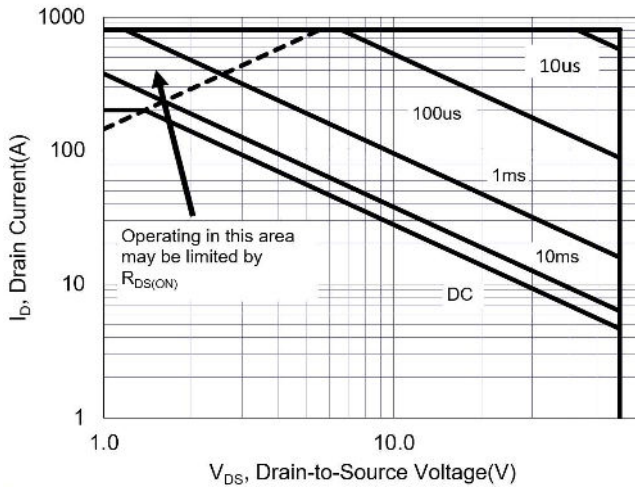


Figure 14. Typical Capacitance vs. Drain-to-Source Voltage

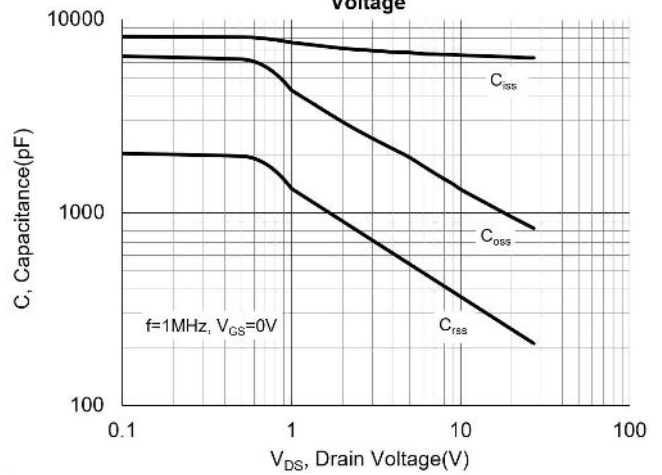


Figure 15. Typical Gate Charge vs. Gate-to-Source Voltage

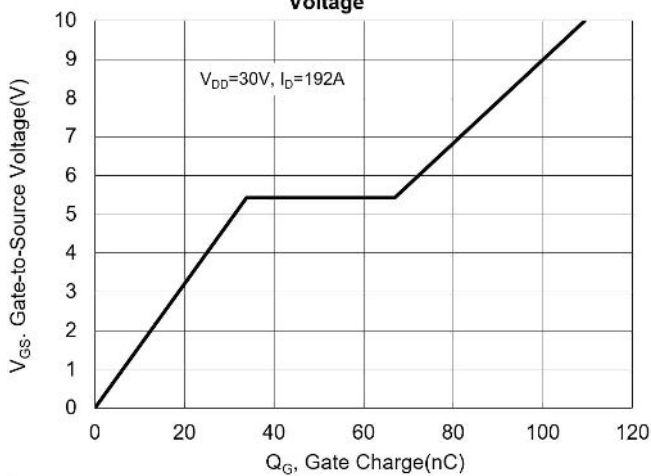
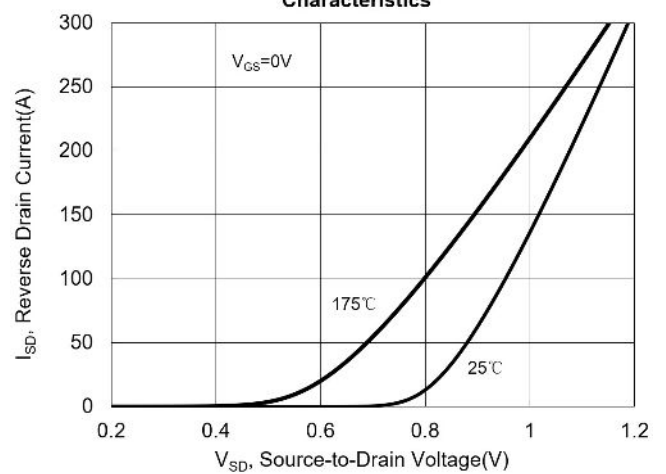
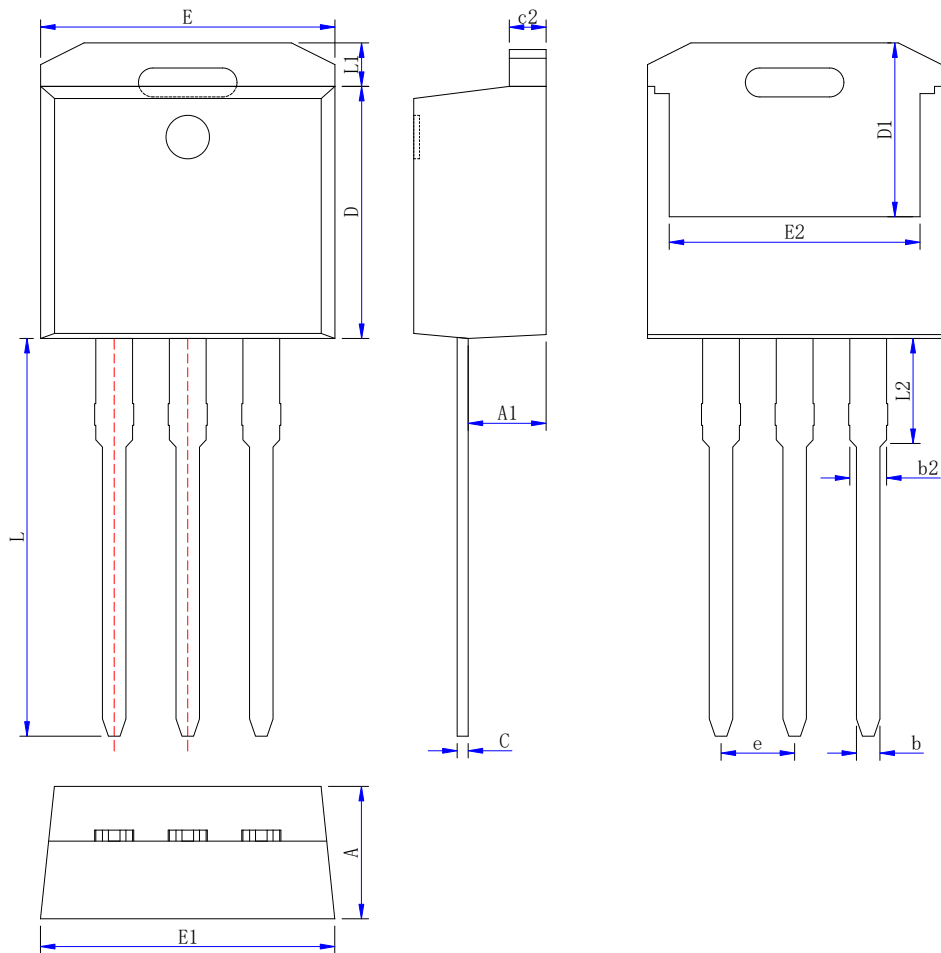


Figure 16. Typical Body Diode Transfer Characteristics



Package Dimensions
TO-262-3L


SYMBOL	MM		INCH	
	MIN	MAX	MIN	MAX
A	4.450	4.650	0.175	0.183
A1	2.030	3.020	0.080	0.119
b	0.510	0.990	0.020	0.039
b2	1.140	1.780	0.045	0.070
c	0.330	0.740	0.013	0.029
c2	1.140	1.650	0.045	0.065
D	8.380	9.650	0.330	0.380
D1	6.860	—	0.270	—
E	9.650	10.670	0.380	0.420
E1	9.475	10.745	0.373	0.423
E2	6.220	—	0.245	—
e	2.540BSC		0.100BSC	
L	13.460	14.100	0.530	0.555
L1	—	1.650	—	0.065
L2	3.360	3.800	0.132	0.150

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