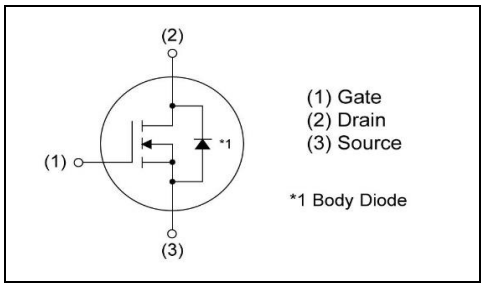
FCD4N60E2 N-CHANNEL POWER MOSFET

V_{DSS}	600	V
I_D	4	A
Trr	88	ns
$R_{DS(ON)Typ}$	0.92	Ω

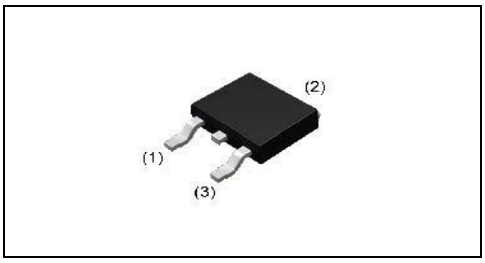
Features

- Super Junction Technology
- Fast body diode eliminates the need for external diode in ZVS applications.
- Lower gate charge results in simpler drive requirements
- Higher gate voltage threshold offers improved noise Immunity
- Low on-resistance
- RoHS compliant



Applications

- Motor control
- Uninterruptible power supplies
- Zero voltage switching SMPS



Ordering Information

Product Number	FCD4N60E2
Package	TO252
Marking	FCD4N60E2
Packing	Tape & Reel
Quantity	2500

Absolute Maximum Ratings（Tc= 25℃, unless otherwise specified）

PARAMETER	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	600	V
Continuous Drain Current	I_D	4	A
Continuous Drain Current T_C = 100 °C	I_D	2.5	A
Pulsed Drain Current	I_{DM} ①	12	A
Gate-Source Voltage	V_{GS}	±30	V
Avalanche Energy, Single Pulse	E_{AS} ②	190	mJ
Avalanche Energy, Repetitive	E_{AR} ①	68	mJ
Avalanche Current, Repetitive	I_{AR} ①	1.2	A
Power Dissipation	P_D	64.4	W

PARAMETER	SYMBOL	RATING	UNIT
Peak Diode Recovery dv/dt	dv/dt ③	3.5	V/ns
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{stg}	–55 to 150	°C

* Drain current is limited by maximum junction temperature

Electrical Characteristics（Tc= 25°C, unless otherwise specified）

PARAMETER	SYMBOL	TEST CONDITION	VALUE			UNIT
			MIN	TYP	MAX	
Drain-source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	600			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta Tj$	I_D=250uA, Referenced to 25°C		0.6		V/°C
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250μA	3.0		5.0	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=600V, V_{GS}=0V, T_C=25°C			1	μA
		V_{DS}=600V, V_{GS}=0V, T_C=125°C			100	μA
Forward Transconductance	G_{fs}	V_{DS}=20V, I_D=2A		3.5		S
Gate-Body Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V			±100	nA
Drain-Source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2A		0.92	1.1	Ω
Gate Resistance	Rg	f=1MHz, open drain		10.5		Ω
Input Capacitance	Ciss	V_{GS}= 0V, V_{DS}=100V f=1.0MHZ		328		pF
Output Capacitance	Coss			18		
Reverse Transfer Capacitance	Crss			0.2		
Turn-On Delay Time	Td(on)	V_{DD}=300V, V_{GS}=10V I_D=4A, R_G=25Ω ④		17.4		ns
Rise Time	Tr			31.2		
Turn -Off Delay Time	Td(off)			33.0		
Fall Time	Tf			45.8		
Total Gate Charge	Qg	I_D=4A, V_{DS}=480V V_{GS}=10V ④		8.8		nC
Gate-Source Charge	Qgs			2.9		nC
Gate-Drain Charge	Qgd			3.0		nC

Source-Drain Diode Characteristics（Tc= 25℃, unless otherwise specified）

PARAMETER	SYMBOL	TEST CONDITION	VALUE			UNIT
			MIN	TYP	MAX	
Source-Drain Current	I_{SD}	Tc=25°C			4	A
Pulsed Source-Drain Current	I_{SDM}				12	A
Diode Forward Voltage	V_{SD}	I_{SD}=4A, V_{GS}=0V			1.4	V
Reverse Recovery Time	Trr	I_{SD}=4A, di/dt=100A/μs		88		ns
Reverse Recovery Charge	Qrr			250		nC
Reverse Recovery Current	Irr			5.4		A

Thermal Characteristics

PARAMETER	SYMBOL	VALUE	UNIT
Thermal Resistance Junction-case	Rth_{JC}	1.94	°C /W
Thermal Resistance Junction-ambient	Rth_{JA}	98.9	°C /W

Notes:

① Repetitive rating: Pulse width is limited by maximum junction temperature

② IAS =2A, VDD = 50V, RG=25Ω, starting TJ = 25°C

③ ISD ≤ 4A, di/dt ≤ 100A/us, VDD ≤ BVDSS, staring TJ =25°C

④ Pulse Test: Pulse width ≤ 300μs, duty cycle ≤ 2%

Electrical Characteristic Curves

Fig1. Output Characteristics

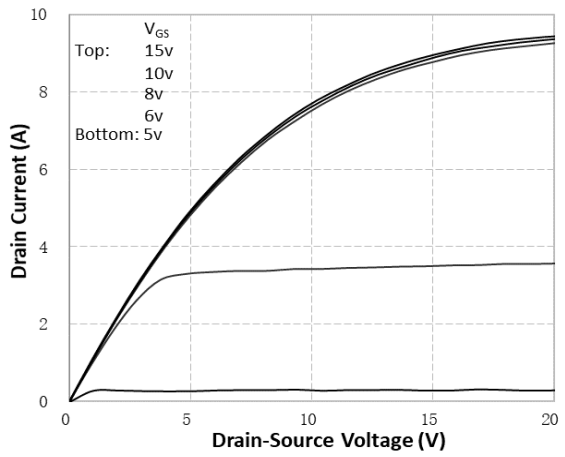


Fig2. Transfer Characteristics

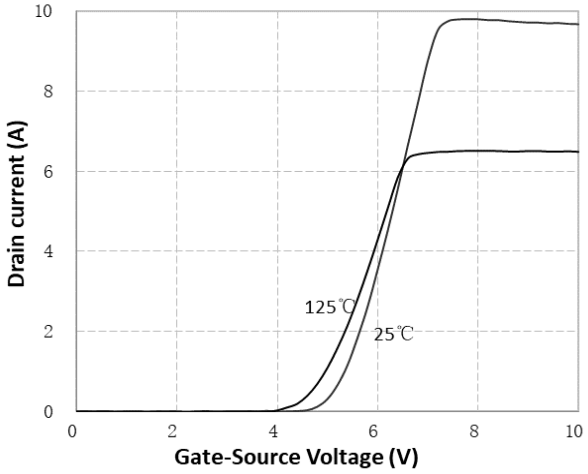


Fig3. On Resistance vs Drain Current

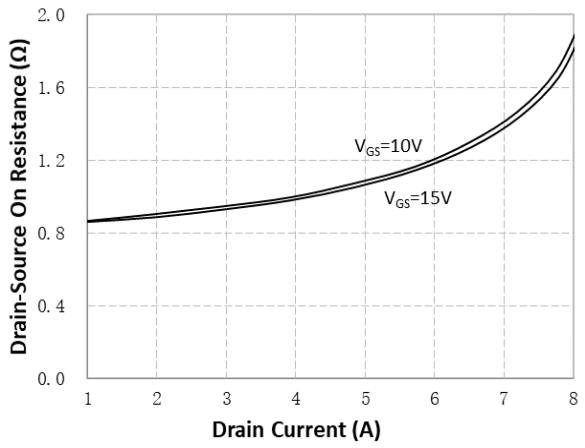


Fig4. On Resistance vs Junction Temperature

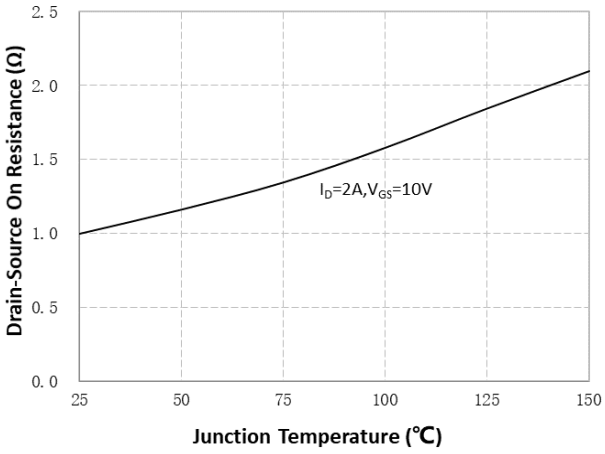


Fig5. Breakdown Voltage vs Junction Temperature

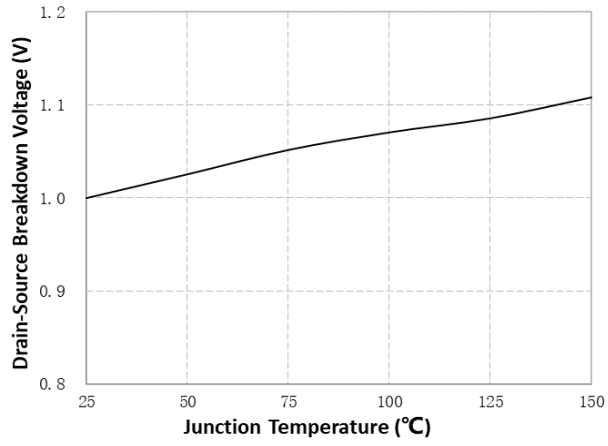


Fig6. Gate Threshold Voltage vs Junction Temperature

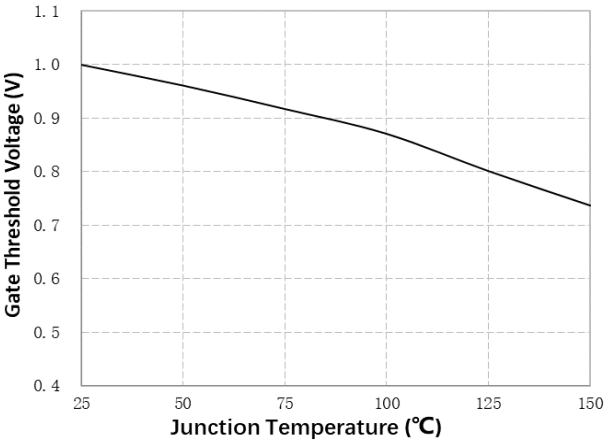


Fig7. Gate Charge Characteristics

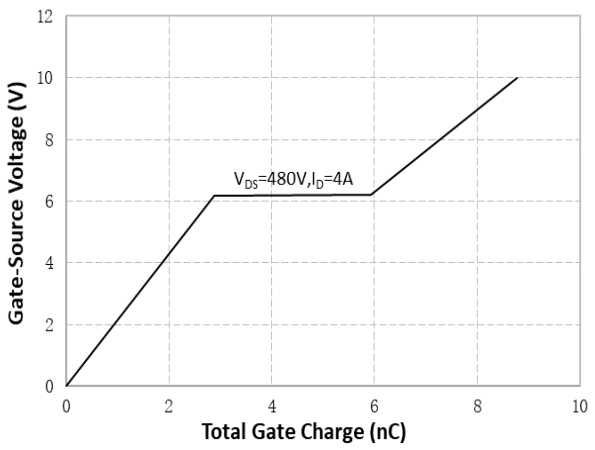


Fig8. Capactiance Characteristics

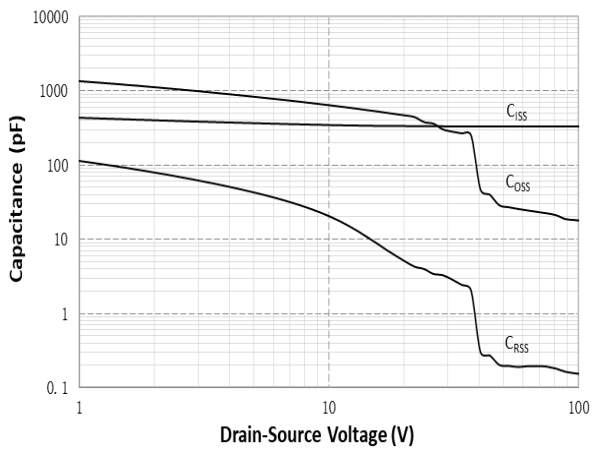


Fig9. On-State Current vs Diode Forward Voltage

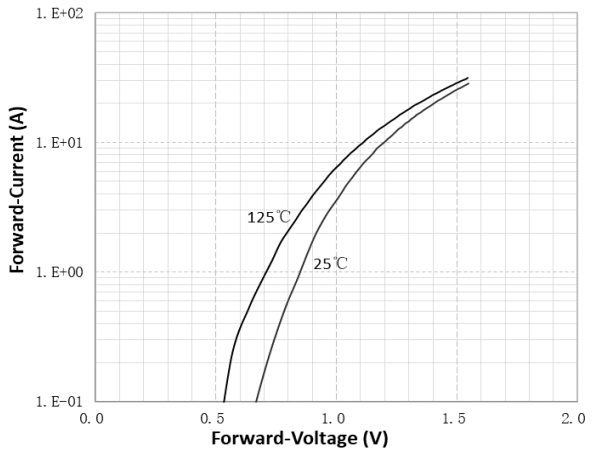


Fig10. Safe Operating Area

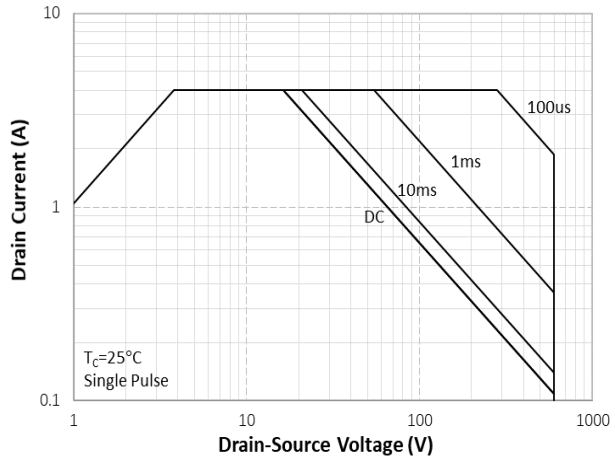
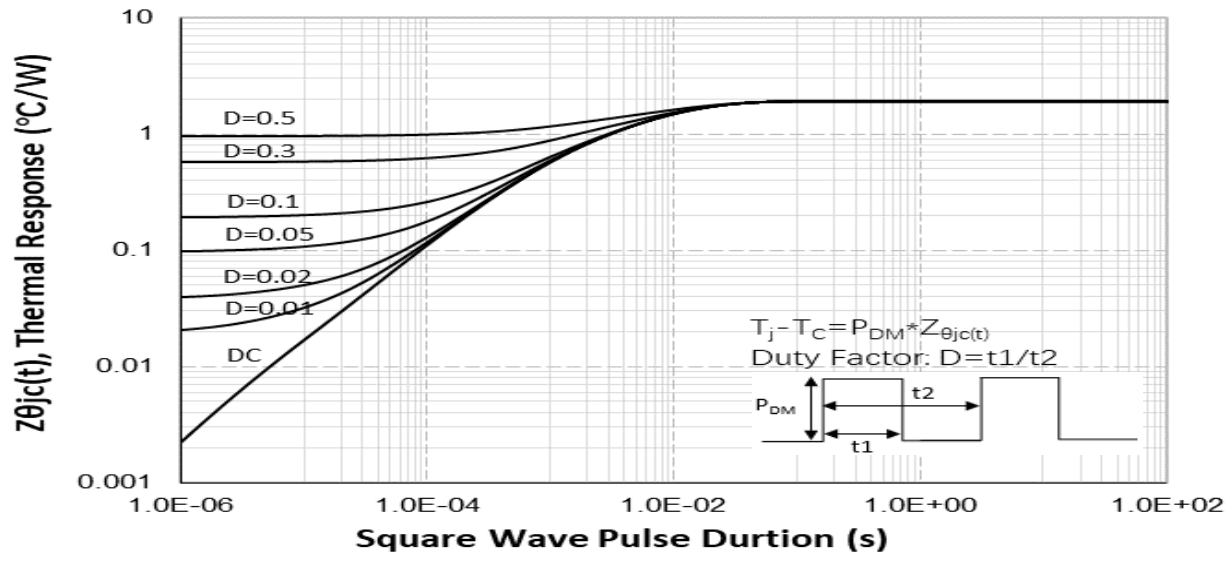


Fig11. Transient Thermal Response Curve



Test Circuit and Waveform

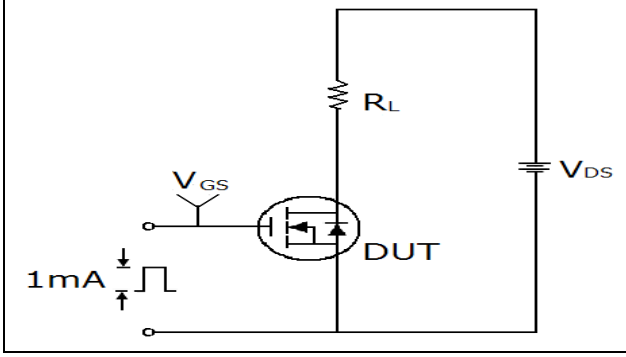
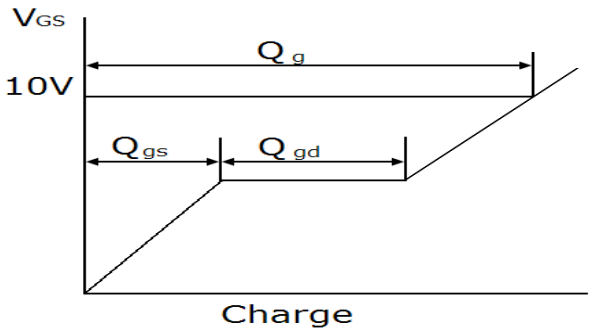
Fig12-1. Gate Charge Test Circuit	Fig12-2. Gate Charge Waveform
	

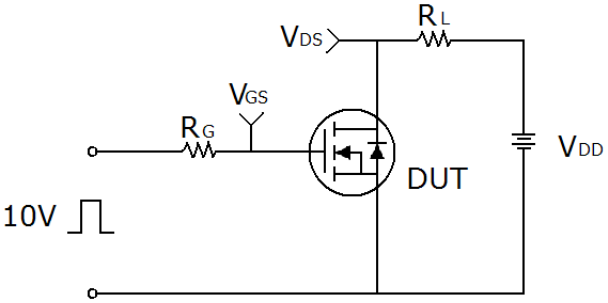
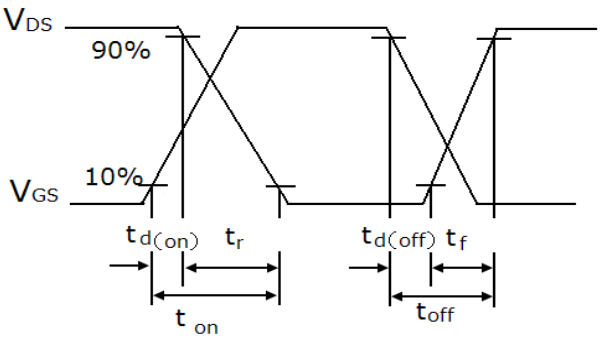
Fig13-1. Switching Time Test Circuit	Fig13-2. Switching Time Waveform
	

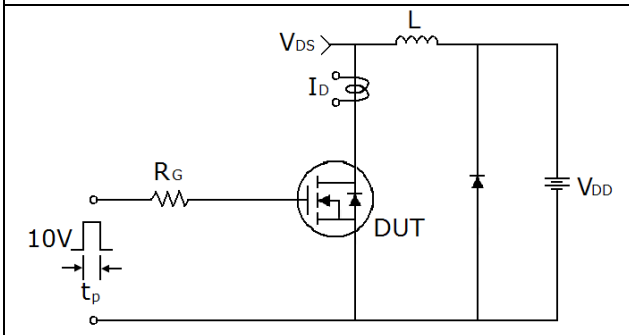
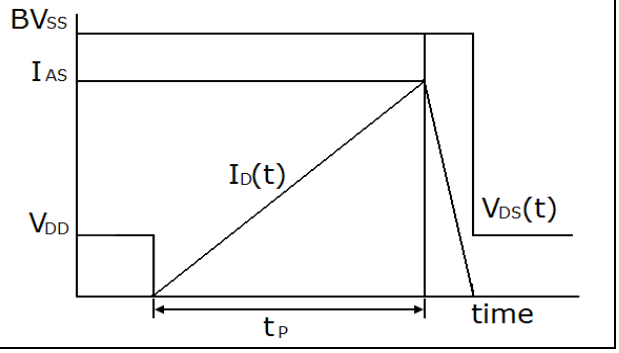
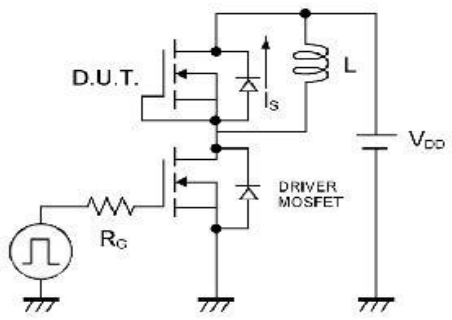
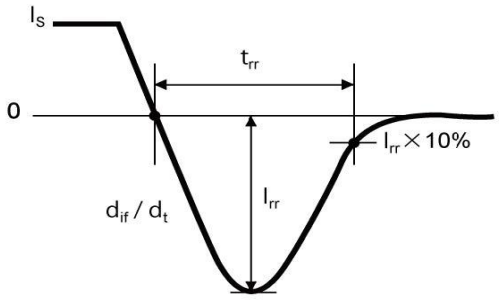
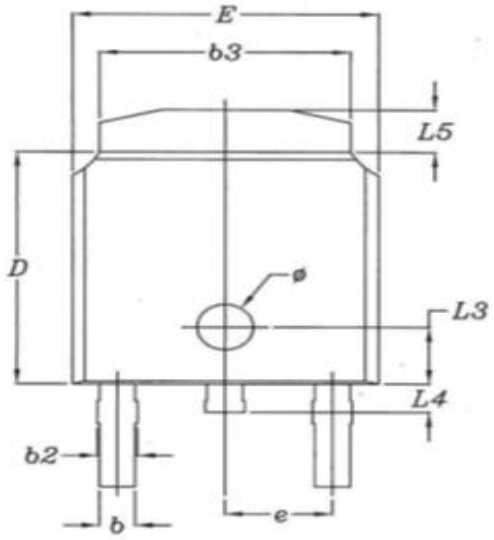
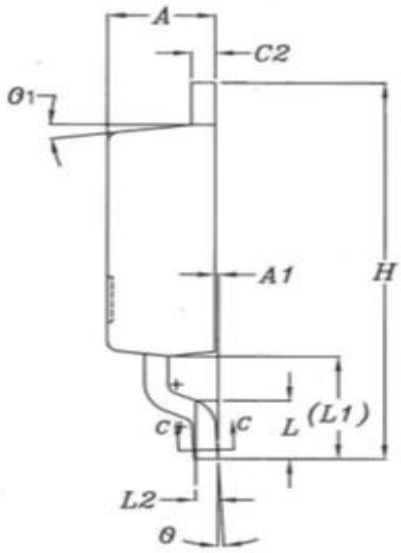
Fig14-1. Unclamped Inductive Switching Test Circuit	Fig14-2. Unclamped Inductive Waveform
	

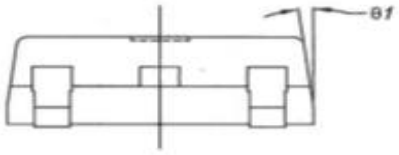
Fig15-1. Diode Recovery Measurement Circuit	Fig15-2. Diode Recovery Waveform
	

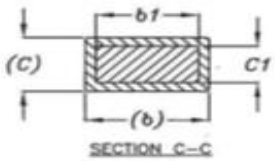
Package Information

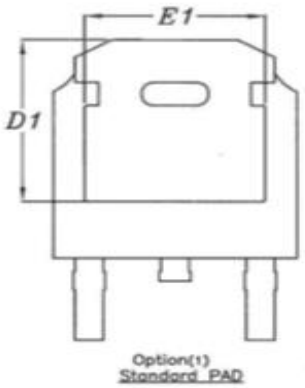
SYMBOL	Value（mm）		SYMBOL	Value（mm）	
	Min	Max		Min	Max
A	2.18	2.39	E1	4.32	—
A1	—	0.13	e	2.29 BSC	
b	0.70	0.89	H	9.40	10.41
b1	0.70	0.86	L	1.40	1.78
b2	0.76	1.14	L1	2.60	2.90
b3	4.95	5.46	L2	0.51 BSC	
c	0.46	0.61	L3	1.65	1.95
c1	0.41	0.56	L4	0.60	0.90
c2	0.46	0.89	L5	0.89	1.27
D	5.97	6.22	θ	1°	5°
D1	5.21	—	θ1	7° REF	
E	6.35	6.73	ϕ	1.20 REF	

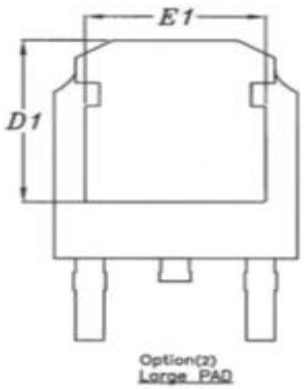












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