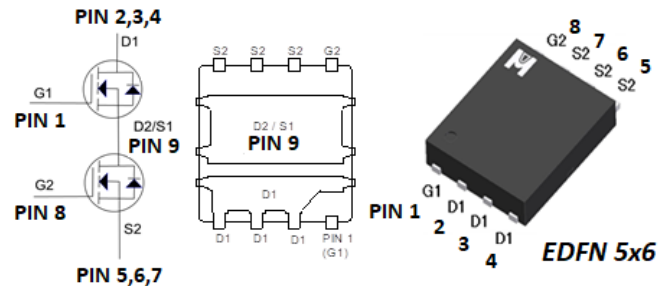


Dual N-Channel Logic Level Enhancement Mode Field Effect Transistor

•Product Summary:

	Q1	Q2
BVDSS	30V	30V
$R_{DSON (MAX.)}@V_{GS}=10V$	7.0m Ω	4.0m Ω
$R_{DSON (MAX.)}@V_{GS}=4.5V$	9.4m Ω	5.4m Ω
$I_D @T_C=25^\circ C$	41A	60A
$I_D @T_A=25^\circ C$	16A	21A

• Pin Description:



Dual N Channel MOSFET

UIS, Rg 100% Tested

Pb-Free Lead Plating & Halogen Free

•ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ C$ Unless Otherwise Noted)



PARAMETERS/TEST CONDITIONS	SYMBOL	LIMITS		UNIT	
		Q1	Q2		
Gate-Source Voltage	V_{GS}	± 20	± 20	V	
Continuous Drain Current	I_D	$T_C = 25^\circ C$	41	60	A
		$T_C = 100^\circ C$	26	38	
Continuous Drain Current	I_D	$T_A = 25^\circ C$	16	21	
		$T_A = 70^\circ C$	12	17	
Pulsed Drain Current ¹	I_{DM}	68	102		
Avalanche Current	I_{AS}	34	53		
Avalanche Energy	L = 0.1mH	EAS	57.8	140.5	mJ
Repetitive Avalanche Energy ²	L = 0.05mH	EAR	28.9	70.2	
Power Dissipation	P_D	$T_C = 25^\circ C$	20.8	25	W
		$T_C = 100^\circ C$	8.3	10	
Power Dissipation	P_D	$T_A = 25^\circ C$	3.1	3.1	W
		$T_A = 70^\circ C$	2	2	
Operating Junction & Storage Temperature Range	T_{jv}, T_{stg}	-55 to 150		$^\circ C$	

• 100% UIS testing in condition of $V_D=15V, L=0.1mH, V_G=10V, I_L=21A$, Rated $V_{DS}=30V$ N-CH_Q1

• 100% UIS testing in condition of $V_D=15V, L=0.1mH, V_G=10V, I_L=32A$, Rated $V_{DS}=30V$ N-CH_Q2

•THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM		UNIT
			Q1	Q2	
Junction-to-Case	$R_{\theta JC}$		6	5	$^\circ C/W$
Junction-to-Ambient ³	$R_{\theta JA}$	$t \leq 10s$	40	40	
		Steady-State	65	65	

¹Pulse width limited by maximum junction temperature.

²Duty cycle < 1%

³65 $^\circ C$ / W when mounted on a 1 in² pad of 2 oz copper.

⁴Guarantee by Engineering test

▪ Q1_ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
STATIC						
Drain-Source Breakdown Voltage ⁴	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250uA	30			V
Gate Threshold Voltage ⁴	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250uA	1.2	1.6	2.5	
Gate-Body Leakage ⁴	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current ⁴	I _{DSS}	V _{DS} = 30V, V _{GS} = 0V			1	uA
		V _{DS} = 30V, V _{GS} = 0V, T _J = 125 °C			100	
On-State Drain Current ¹	I _{D(ON)}	V _{DS} = 10V, V _{GS} = 10V	41			A
Drain-Source On-State Resistance ^{1,4}	R _{DS(ON)}	V _{GS} = 10V, I _D = 20A		5.2	7	mΩ
		V _{GS} = 4.5V, I _D = 20A		7	9.4	
Forward Transconductance ¹	g _{fs}	V _{DS} = 5V, I _D = 20A		48		S
DYNAMIC						
Input Capacitance ⁵	C _{iss}	V _{GS} = 0V, V _{DS} = 15V, f = 1MHz		1050		pF
Output Capacitance ⁵	C _{oss}			160		
Reverse Transfer Capacitance ⁵	C _{rss}			105		
Gate Resistance ^{4,5}	R _g	f = 1MHz		0.8	1.7	Ω
Total Gate Charge ^{1,2,5}	Q _g (V _{GS} =10V)	V _{DS} = 15V, V _{GS} = 10V, I _D = 20A		20.0		nC
	Q _g (V _{GS} =4.5V)			10.0		
Gate-Source Charge ^{1,2,5}	Q _{gs}			3.0		
Gate-Drain Charge ^{1,2,5}	Q _{gd}			5.0		
Turn-On Delay Time ^{1,2,5}	t _{d(on)}		V _{DS} = 15V, V _{GS} = 10V, I _D = 5A, R _g = 6Ω		7.0	
Rise Time ^{1,2,5}	t _r			12.0		
Turn-Off Delay Time ^{1,2,5}	t _{d(off)}			15.0		
Fall Time ^{1,2,5}	t _f			2.0		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Continuous Current	I _S				41	A
Pulsed Current ³	I _{SM}				68	
Forward Voltage ^{1,4}	V _{SD}	I _F = 20A, V _{GS} = 0V			1.2	V
Reverse Recovery Time ⁵	t _{rr}	I _F = 20A, dI _F /dt = 400A / uS		8.0		nS
Peak Reverse Recovery Current ⁵	I _{RM(REC)}			2.40		A
Reverse Recovery Charge ⁵	Q _{rr}			10.0		nC

¹Pulse test : Pulse Width ≤ 300 usec, Duty Cycle ≤ 2%.

²Independent of operating temperature.

³Pulse width limited by maximum junction temperature.

⁴Guarantee by FT test Item

⁵Guarantee by Engineering test

EMC will review datasheet by quarter, and update new version.

▪Q1_TYPICAL CHARACTERISTICS

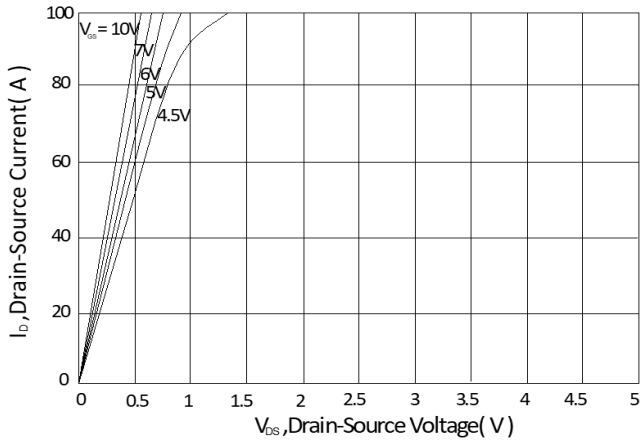


Fig.1 Typical Output Characteristics

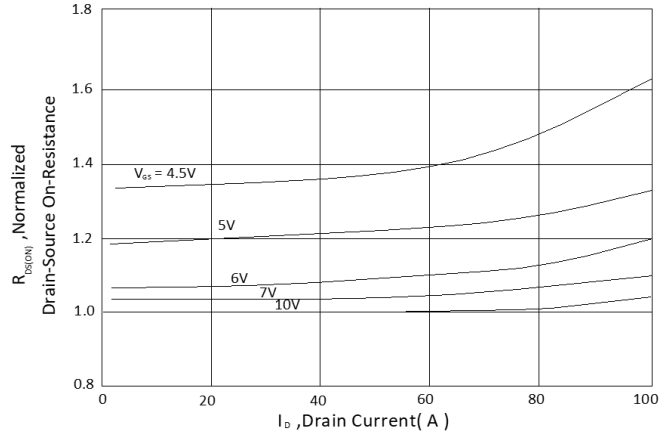


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

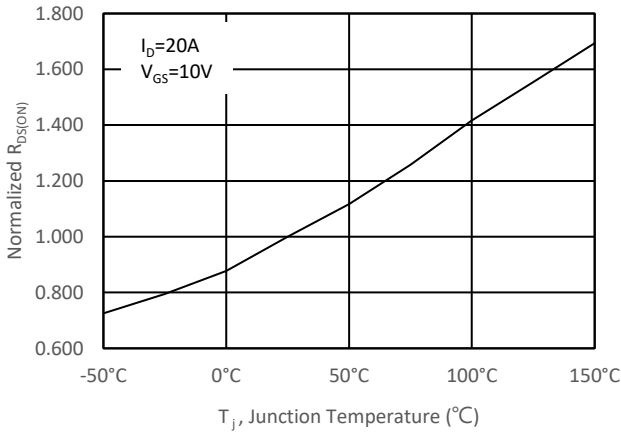


Fig.3 Normalized On-Resistance v.s. Junction Temperature

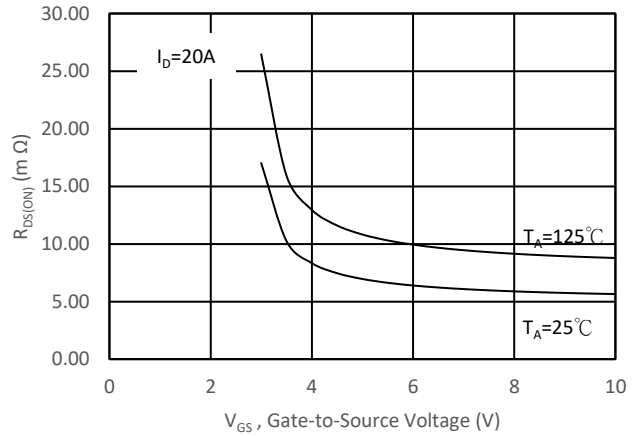


Fig.4 On-Resistance v.s. Gate Voltage

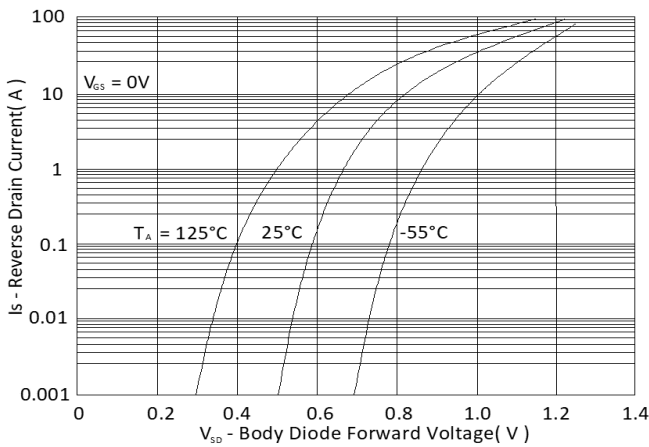


Fig.5 Forward Characteristic of Reverse Diode

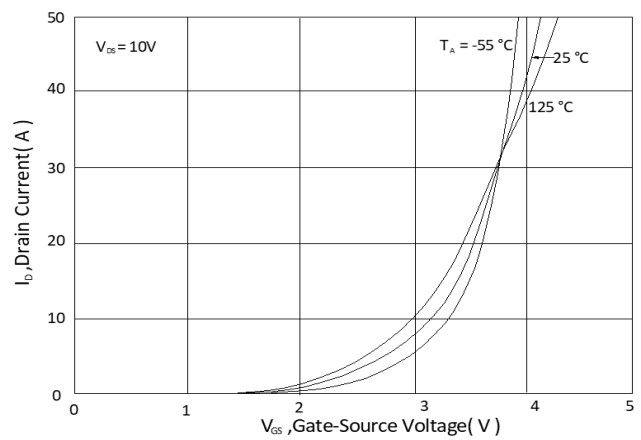


Fig.6 Transfer Characteristics

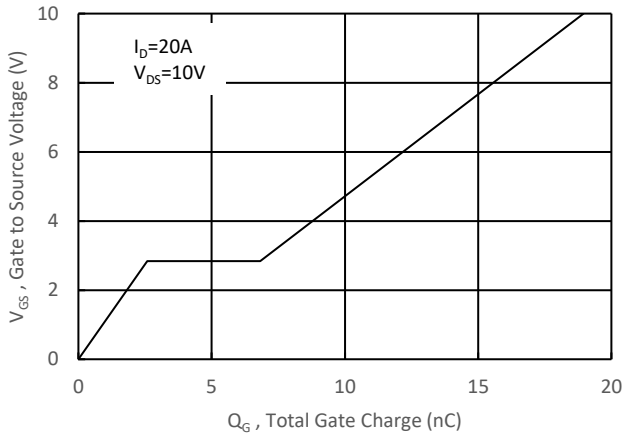


Fig.7 Gate Charge Characteristics

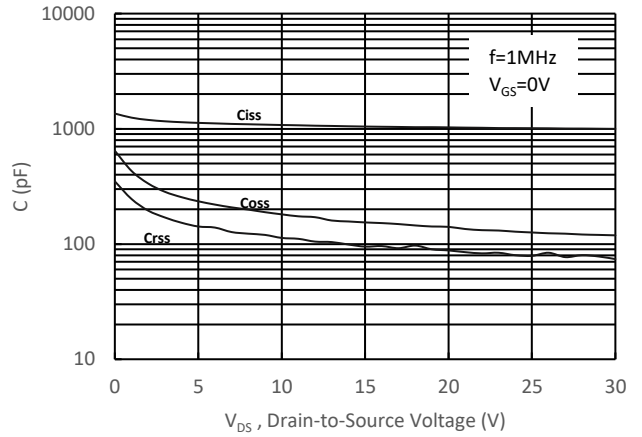


Fig.8 Typical Capacitance Characteristics

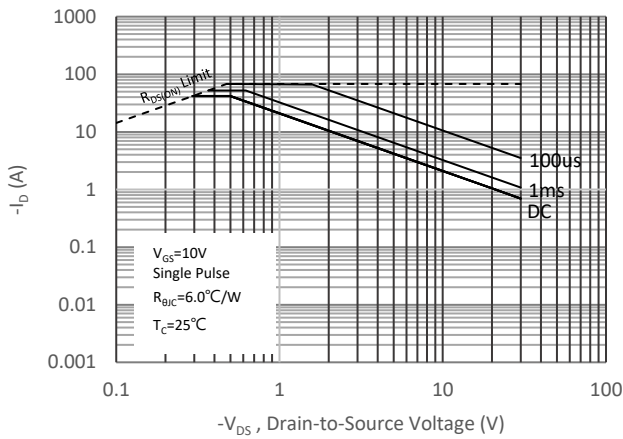


Fig 9. Maximum Safe Operating Area

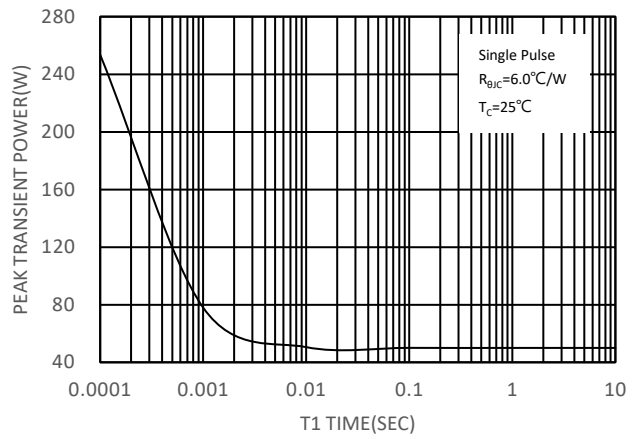


Fig 10. Single Pulse Maximum Power Dissipation

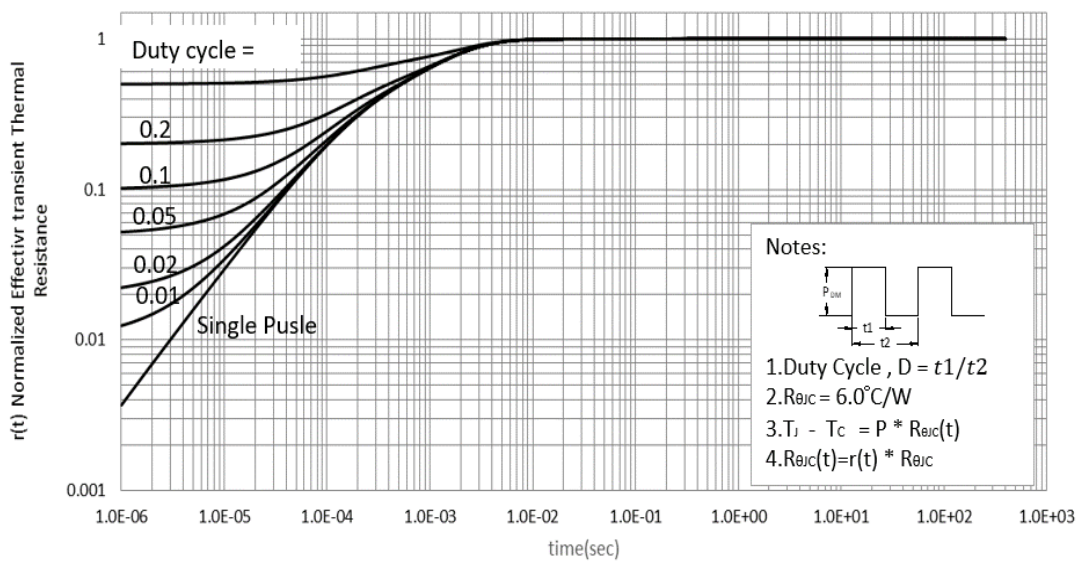


Fig 11. Effective Transient Thermal Impedance

▪ Q2_ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
STATIC						
Drain-Source Breakdown Voltage ⁴	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250uA	30			V
Gate Threshold Voltage ⁴	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250uA	1.2	1.6	2.5	
Gate-Body Leakage ⁴	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current ⁴	I _{DSS}	V _{DS} = 30V, V _{GS} = 0V			1	uA
		V _{DS} = 30V, V _{GS} = 0V, T _J = 125 °C			100	
On-State Drain Current ¹	I _{D(ON)}	V _{DS} = 10V, V _{GS} = 10V	60			A
Drain-Source On-State Resistance ^{1,4}	R _{DS(ON)}	V _{GS} = 10V, I _D = 20A		3.0	4.0	mΩ
		V _{GS} = 4.5V, I _D = 20A		4.0	5.4	
Forward Transconductance ¹	g _{fs}	V _{DS} = 5V, I _D = 20A		30		S
DYNAMIC						
Input Capacitance ⁵	C _{iss}	V _{GS} = 0V, V _{DS} = 15V, f = 1MHz		2100		pF
Output Capacitance ⁵	C _{oss}			320		
Reverse Transfer Capacitance ⁵	C _{rss}			160		
Gate Resistance ^{4,5}	R _g	f = 1MHz		2.0	4.0	Ω
Total Gate Charge ^{1,2,5}	Q _g (V _{GS} =10V)	V _{DS} = 15V, V _{GS} = 10V, I _D = 20A		38.0		nC
	Q _g (V _{GS} =4.5V)			20.0		
Gate-Source Charge ^{1,2,5}	Q _{gs}			6.0		
Gate-Drain Charge ^{1,2,5}	Q _{gd}			8.0		
Turn-On Delay Time ^{1,2,5}	t _{d(on)}		V _{DS} = 15V, V _{GS} = 10V, I _D = 5A, R _g = 6Ω		10.0	
Rise Time ^{1,2,5}	t _r			41.0		
Turn-Off Delay Time ^{1,2,5}	t _{d(off)}			32.0		
Fall Time ^{1,2,5}	t _f			25.0		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Continuous Current	I _S				60	A
Pulsed Current ³	I _{SM}				102	
Forward Voltage ^{1,4}	V _{SD}	I _F = 20A, V _{GS} = 0V			1.2	V
Reverse Recovery Time ⁵	t _{rr}	I _F = 20A, dI _F /dt = 400A / uS		15.0		nS
Peak Reverse Recovery Current ⁵	I _{RM(REC)}			2.60		A
Reverse Recovery Charge ⁵	Q _{rr}			20.0		nC

¹Pulse test : Pulse Width ≤ 300 usec, Duty Cycle ≤ 2%.

²Independent of operating temperature.

³Pulse width limited by maximum junction temperature.

⁴Guarantee by FT test Item

⁵Guarantee by Engineering test

EMC will review datasheet by quarter, and update new version.

▪Q2_TYPICAL CHARACTERISTICS

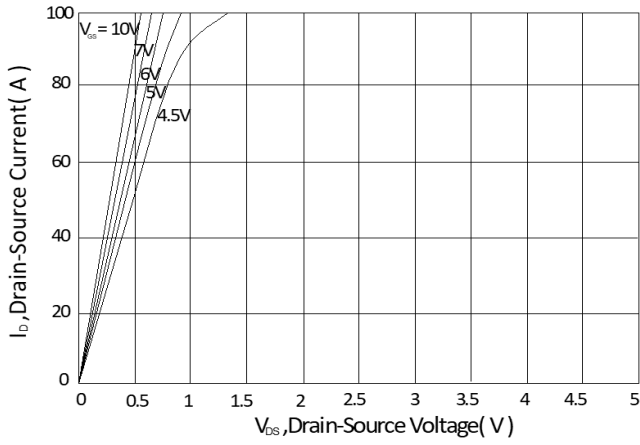


Fig.1 Typical Output Characteristics

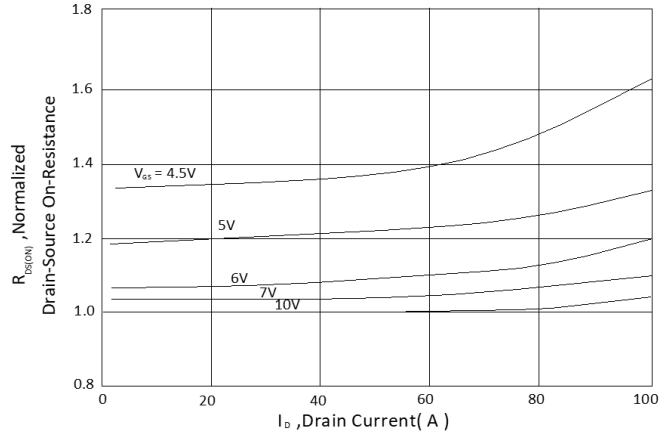


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

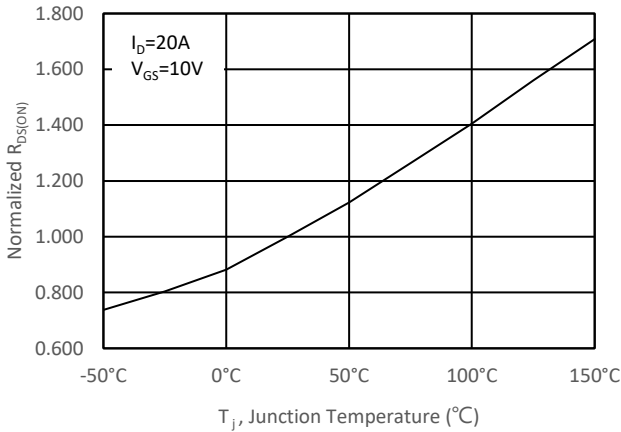


Fig.3 Normalized On-Resistance v.s. Junction Temperature

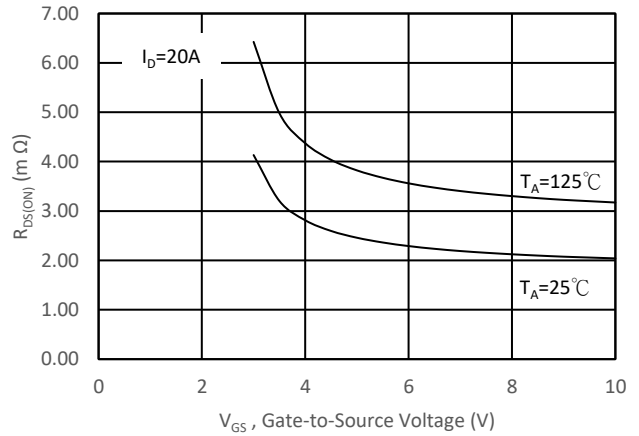


Fig.4 On-Resistance v.s. Gate Voltage

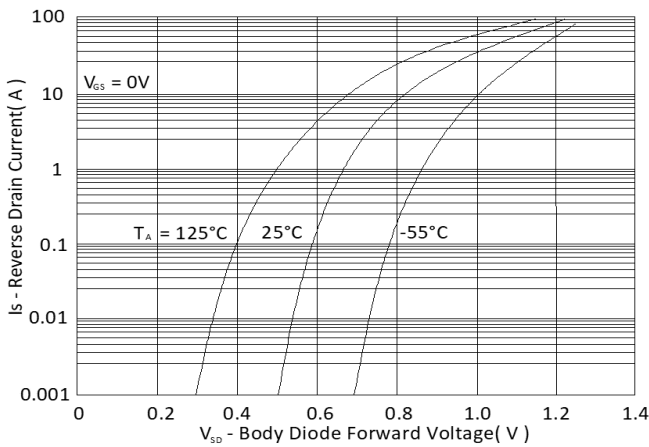


Fig.5 Forward Characteristic of Reverse Diode

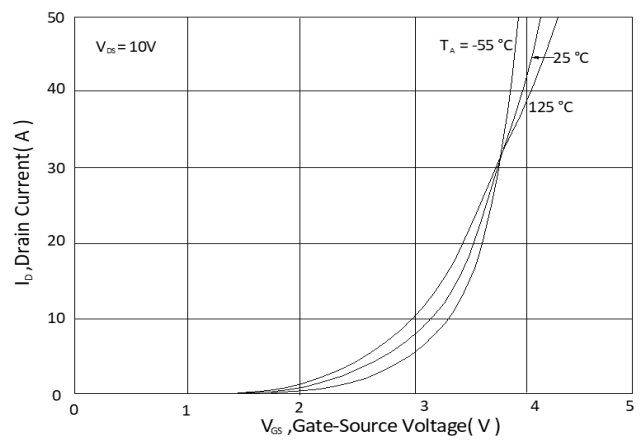


Fig.6 Transfer Characteristics

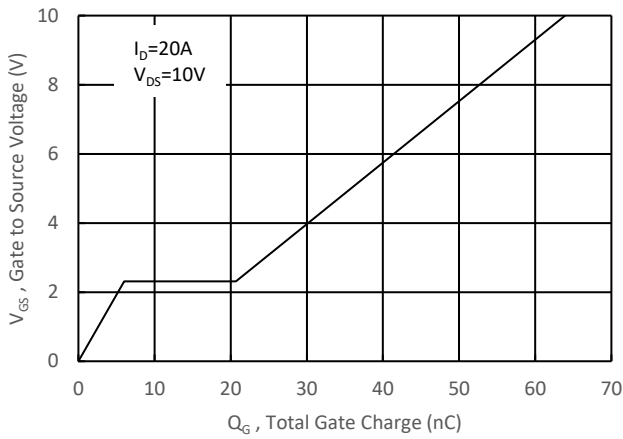


Fig.7 Gate Charge Characteristics

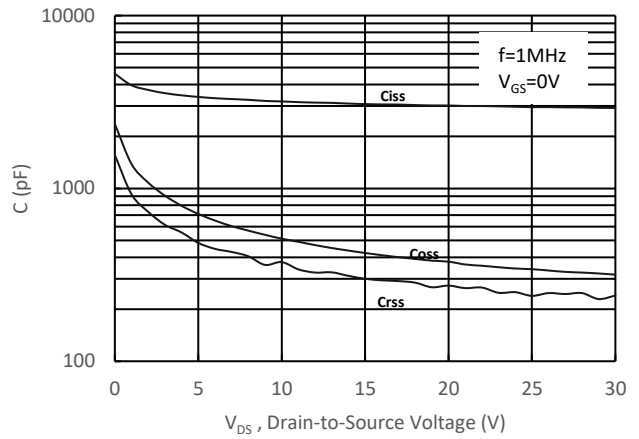


Fig.8 Typical Capacitance Characteristics

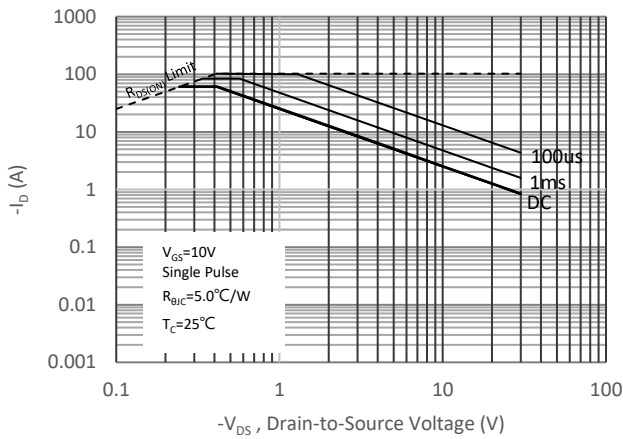


Fig 9. Maximum Safe Operating Area

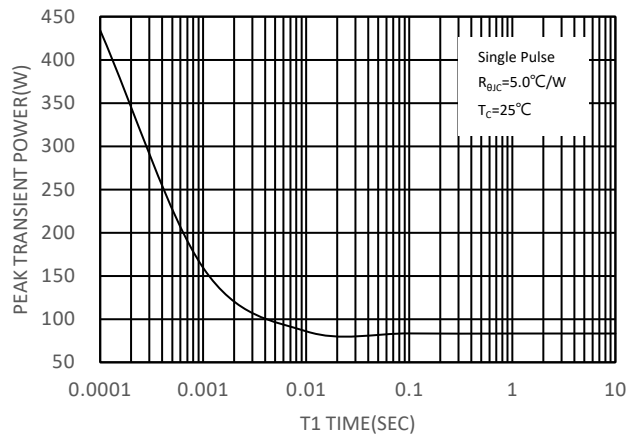


Fig 10. Single Pulse Maximum Power Dissipation

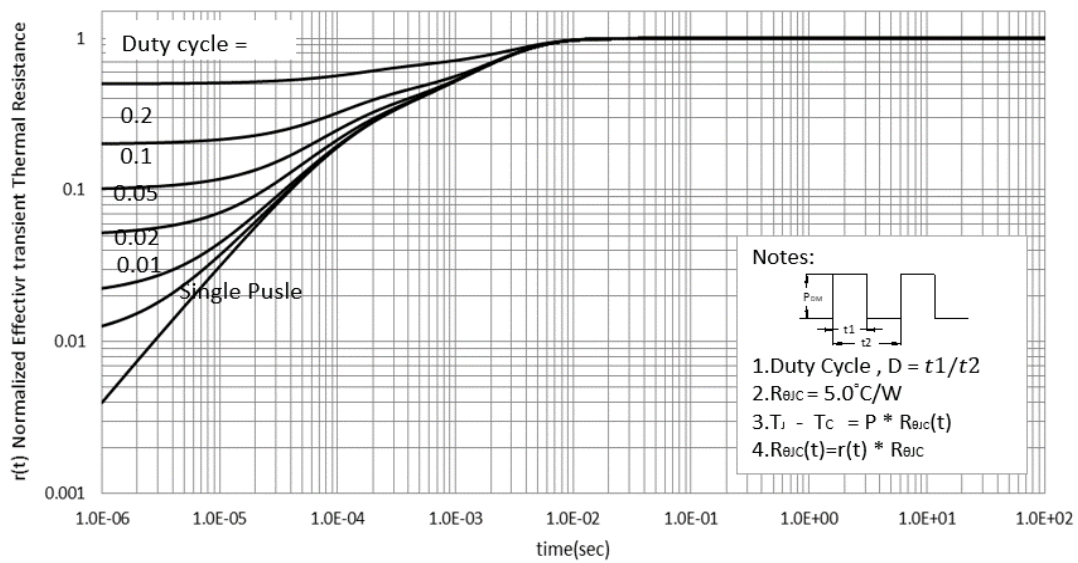


Fig 11. Effective Transient Thermal Impedance

Ordering & Marking Information:

Device Name: EMP38K03HPC for Asymmetric Dual EDFN5X6



P38K03: Device Name

ABCDEFGH: Date Code

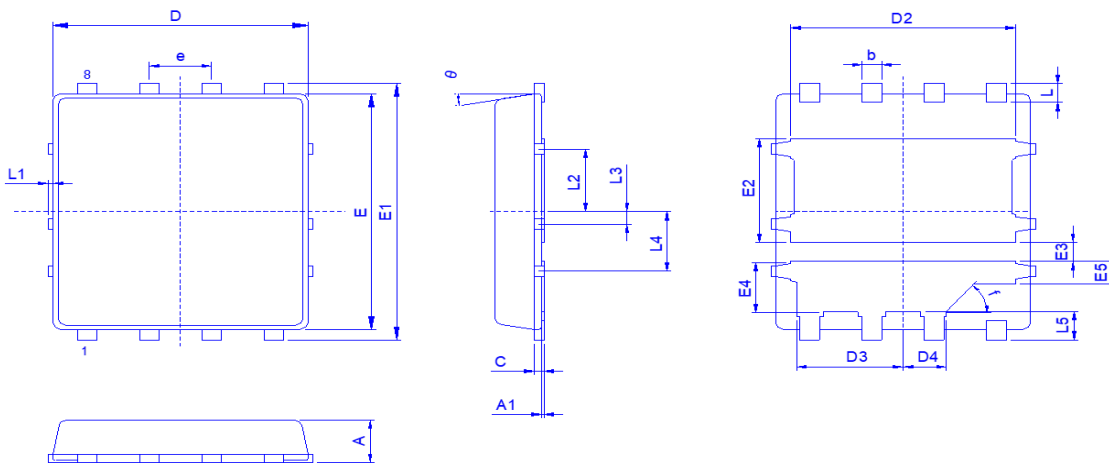
A: Assembly House

B: Year(A:2008 B:2009 C:2010....)

C: Month(A:01 B:02 C:03 D:04 E:05 F:06 G:07 H:08 I:09 J:10 K:11 L:12)

DEFG: Serial No.

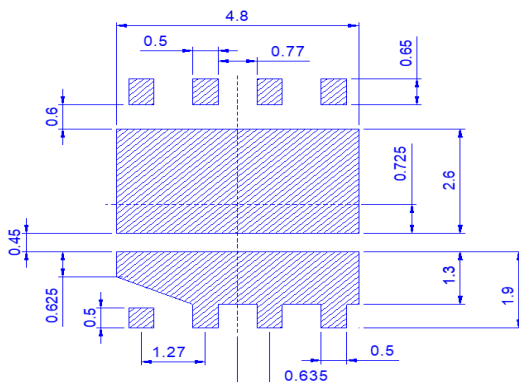
Outline Drawing



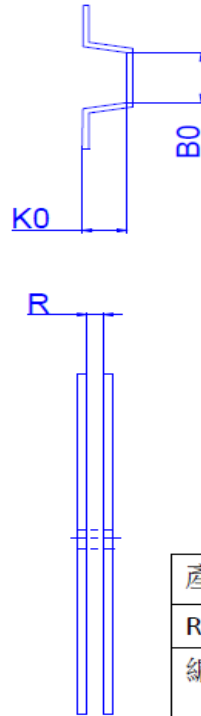
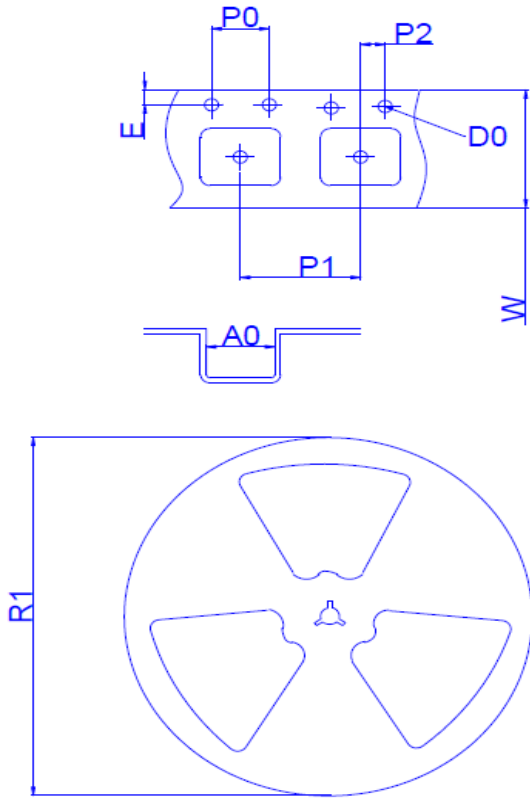
Dimension	A	A1	b	c	D	D2	D3	D4	E	E1	E2	E3	E4
Min.	0.85	-	0.35	0.15	4.8	4.3	1.995	0.835	5.55	5.9	1.95	0.3	1.025
Typ.	0.9		0.4	0.2	5	4.5	2.105	0.885	5.65	6.05	2.1	0.45	1.175
Max.	1	0.05	0.48	0.28	5.2	4.7	2.255	1.3	5.85	6.2	2.5	0.6	1.325

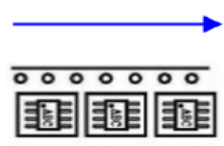
Dimension	E5	e	L	L1	L2	L3	L4	L5	F	θ
Min.	0.375		0.35		1	0.2	1.3	0.575		0°
Typ.	0.525	1.27	0.45		1.1	0.3	1.4	0.675	45°	
Max.	0.675		0.55	0.15	1.575	0.4	1.5	0.775		14°

Footprint



◆ Tape&Reel Information:2500pcs/Reel



產品別	EDFN 5*6
Reel 尺寸	13"
編帶方式	FEED DIRECTION 

Dimension in mm

Dimension	Carrier tape									Reel	
	A0	B0	D0	E	K0	P0	P1	P2	W	R	R1
Typ.	6.4	5.3	1.5	1.8	1.6	4.0	8.0	2.0	12.0	17.0	330.0
±	0.2	0.2	0.1	0.1	0.6	0.1	0.1	0.1	0.3	2.0	2.0